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1990 Weed Control for Corn, Soybeans, and Sorghum

This guide is based on the results of research conducted by the University of Illinois Agricultural Experiment Station, other experiment stations, and the United States Department of Agriculture (USDA). Consideration has been given to the soils, crops, and weed problems of Illinois.

The user must have an understanding of the benefits and risks associated with cultural weed control methods such as primary tillage, row cultivation, and rotary hoeing. Since these practices change little from year to year, the majority of this text will focus on helping make practical, economical, and environmentally sound decisions regarding herbicide use.

Precautions

When selecting a weed control option, consider not only the benefit of controlling the weeds, but the risks involved in using a herbicide. Risks can be reduced by observing the following precautions.

- Apply herbicides only to those crops for which use has been approved.
- Clean tanks thoroughly when changing herbicides, especially when using a postemergence herbicide. Use a 1-percent ammonia wash to clean any traces of 2,4-D or dicamba from the tank before spraying soybeans. Some herbicide labels provide cleaning suggestions.
- Correctly calibrate the sprayer, and check the nozzle output and adjustment before adding the herbicide.
- Use recommended rates. Applying too much herbicide is costly and, in addition, can damage crops and cause illegal residues. Using too little herbicide can result in poor weed control.
- Apply herbicides only at times specified on the label. Observe the recommended intervals between treatment and pasturing or between treatment and harvesting of crops, as well as recommended intervals between application and subsequent planting of crops.
- Guard against drift injury to nearby susceptible plants, such as ornamentals and vegetables, as well as agronomic crops. Mist or vapors from 2,4-D and dicamba sprays may drift several hundred yards. Whenever possible, operate sprayers at low pressure with tips that deliver large droplets. Spray only on calm days or make sure that the wind is not moving toward susceptible crop plants and ornamentals. Use special precaution with Command.
- Avoid applying a herbicide to a crop that is under stress or predisposed to injury. Under certain conditions some herbicides may damage the crop when environmental conditions reduce the plant's ability to resist injury.
- Avoid planting a susceptible crop in a field where herbicide carryover is likely. This typically occurs in the year following a very dry year.
- Applicators should use appropriate precautions to protect themselves and others from exposure to herbicides.
- Be sure that animals or persons not directly involved in the operation are not present in the area. Use special precautions near residential areas.
- Several herbicide labels carry the following groundwater warnings under either the environmental hazard or the groundwater advisory section. "X is a chemical that can travel (seep or leach) through soil and enter groundwater which may be used as drinking water. X has been found in groundwater as a result of its use as a herbicide. Users of this product are advised not to apply X where the soils are very

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permeable (that is, well-drained soils such as loamy sands) and the water table is close to the surface."

- Check the herbicide label for the proper method of container disposal. Triple rinse, puncture, and haul metal containers to an approved sanitary landfill. Haul paper containers to a sanitary landfill, or burn them in an approved manner.
- Promptly return unused herbicides to a safe storage place. Store them in the original containers away from unauthorized persons, particularly children.
- Because formulations and labels are sometimes changed and government regulations modified, always refer to the most recent product label.

This guide has been developed to help you use herbicides as effectively and safely as possible. Because no guide can remove all the risk involved, however, the University of Illinois and its employees assume no responsibility for the results of using herbicides, even if they have been used according to the suggestions, recommendations, or directions of the manufacturer or any governmental agency.

Cultural and mechanical control

Good cultural practices that aid in weed control include adequate seedbed preparation, adequate fertilization, crop rotation, planting on the proper date, use of the optimum row width, and seeding at the rate required for optimum stands.

Planting in relatively warm soil can help the crop emerge quickly and compete better with weeds. Good weed control during the first 3 to 5 weeks is extremely important for both corn and soybeans. If weed control is adequate during that period, corn and soybeans will usually compete quite well with most of the weeds that begin growing later.

Narrow rows will shade the centers faster and help the crop compete better with the weeds. If herbicides alone cannot give adequate weed control, however, then keep rows wide enough to allow for cultivation. Some of the newer herbicides are improving the chances of achieving adequate control without cultivation.

If a preemergence or preplant herbicide does not appear to be controlling weeds adequately, use the rotary hoe while weeds are still small enough to be controlled. Use the rotary hoe after weed seeds have germinated but before most weeds have emerged. Operate it at 8 to 12 miles per hour, and weight it enough to stir the soil and kill the tiny weeds. Rotary hoeing also aids crop emergence if the soil is crusted.

Row cultivators also should be used while weeds are small. Throwing soil into the row can help smother small weeds. Cultivate shallowly to prevent injury to crop roots.

Herbicides can provide a convenient and economical means of early weed control and allow for delayed and faster cultivation. Furthermore, unless the soil is crusted, it may not be necessary to cultivate some fields if herbicides are controlling weeds adequately.

Herbicide incorporation

Soil-applied herbicides are incorporated to minimize surface loss, reduce dependence upon rainfall, and provide appropriate placement of the herbicide. Herbicides such as Sutan+ and Eradicane are incorporated soon after application to minimize surface loss from volatilization. Treflan and Sonalan are incorporated to minimize loss due to photodecomposition and volatilization. Triazine herbicides such as atrazine and Bladex and acetamide herbicides such as Lasso and Dual may be incorporated to minimize dependence upon timely rainfall; but because these herbicides are not lost as quickly from the soil surface, the timing of incorporation is less critical.

Incorporation should place the herbicide uniformly throughout the top 1 or 2 inches of soil for the best control of small-seeded annual weeds that germinate at shallow depths. Slightly deeper placement may improve the control of certain weeds from deep-germinating seed under relatively dry conditions. Incorporating too deeply, however, tends to dilute the herbicide and may reduce the effectiveness. The field cultivator and tandem disk place most of the herbicide at about one-half the depth of operation. Thus for most herbicides, the suggested depth of operation is 3 to 4 inches.

Thorough incorporation with ground-driven implements requires two passes. Single-pass incorporation can result in streaked weed control, especially in moist soils. It can also cause concentrated zones of herbicide, which are conducive to crop injury. Single-pass incorporation may be adequate with some herbicides that tend to move laterally in the soil. It may also be adequate with some equipment, especially if rotary hoeing, cultivation, or subsequent herbicide treatments are used to improve weed control. If the first pass sufficiently covers the herbicide to prevent surface loss, the second pass can be delayed until immediately before planting.

The depth and thoroughness of incorporation depend upon the type of equipment used, the depth and speed of operation, the texture of the soil, and the amount of soil moisture. Field cultivators and tandem disks are commonly used for incorporation; however, disk-chisels and other combination tools are being used in some areas.

Field cultivators

Field cultivators are frequently used for herbicide incorporation. They should have three or more rows of shanks with an effective shank spacing of no more than 8 to 9 inches (a spacing of 24 to 27 inches on each of three rows). The shanks may be equipped with points or sweeps. Sweeps usually give better

incorporation, especially when soil conditions are a little too wet or dry for optimum soil flow and mixing. Sweeps for C-shank cultivators should be at least as wide as the effective shank spacing.

The recommended operating depth for the field cultivator is 3 to 4 inches. It is usually sufficient to operate the field cultivator only deep enough to remove tractor tire depressions. The ground speed should be at least 6 miles per hour. The field cultivator must be operated in a level position so that the back shanks are not operating in untreated soil, which would result in streaked weed control. Two passes are recommended to obtain uniform weed control. If single-pass incorporation is preferred, the use of wider sweeps or narrower spacing with a 3- to 5-bar harrow or rolling baskets pulled behind will increase the probability of obtaining adequate weed control.

Tandem disks

Tandem disk harrows invert the soil and usually place the herbicide deeper in the soil than most other incorporation tools. Tandem disks used for herbicide incorporation should have disk blade diameters of 20 inches or less and blade spacings of 7 to 9 inches. Larger disks are considered primary tillage tools and should not be used for incorporating herbicides. Spherical disk blades give better herbicide mixing than do conical disk blades.

Tandem disks usually place most of the herbicide in the top 50 to 60 percent of the operating depth. For most herbicides, the suggested operating depth is from 3 to 4 inches. Two passes are recommended to obtain uniform mixing with a double disk. A leveling device (harrow or rolling baskets) should be used behind the disk to obtain proper mixing. Recommended ground speeds are usually between 4 and 6 miles per hour. The speed should be sufficient to move the soil the full width of the blade spacing. Lower speeds can result in herbicide streaking.

Combination tools

Several new tillage tools combine disk gangs, field cultivator shanks, and leveling devices. Many of these combination tools can handle large amounts of surface residue without clogging and yet leave considerable crop residue on the soil surface for erosion control. Results indicate that these combination tools may provide more uniform one-pass incorporation than does a disk or field cultivator, but one pass with them is generally no better than two passes with the disk or field cultivator.

Chemical weed control

Plan your weed-control program to fit your soils, tillage program, crops, weed problems, and farming operations. Good herbicide performance depends on the weather and on wise selection and application. Your decisions about herbicide use should be based on the nature and seriousness of your weed problems. The herbicide selectivity tables at the end of this guide indicate the susceptibility of our most common weed species to herbicides.

Corn or soybeans may occasionally be injured by some of the herbicides registered for use on these crops. To reduce injury to crops, apply the herbicide uniformly, at the time specified on the label, and at the correct rate. (See the section entitled "Herbicide rates.") Crop tolerance ratings for various herbicides are also given in the tables at the end of this guide. Unfavorable conditions such as cool, wet weather, delayed crop emergence, deep planting, seedling diseases, soil in poor physical condition, and poor-quality seed may contribute to crop stress and herbicide injury. Hybrids and varieties also vary in their tolerance to herbicides and environmental stress factors. Once injured by a herbicide, plants are prone to disease.

Crop planting intentions for next season must also be considered. Where atrazine or simazine are used, you should not plant spring-seeded small grains, small-seeded legumes and grasses, or vegetables the following year. Be sure that the application of Treflan or similar herbicides for soybeans is uniform and sufficiently early to reduce the risk of injury to wheat or corn following soybeans. Note that certain cropping restrictions apply for Command, Scepter, Classic, Canopy, Preview, and Lorox Plus. Refer to the herbicide label for information about cropping sequence and appropriate intervals to allow between different crops.

Some herbicides have different formulations and concentrations under the same trade name. *No endorsement of any trade name is implied, nor is discrimination against similar products intended.*

Herbicide combinations

Herbicide combinations can control more weed species, reduce carryover, or reduce crop injury. Numerous combinations of herbicides are sold as premixes, while others are tank-mixed. Registered tank-mixes are shown in Tables 2, 7, and 10. Tank-mixing allows you to adjust the ratio of herbicides to fit local weed and soil conditions, while premixes may overcome some of the compatability problems found with tank-mixing. When using a tank-mix, you must follow restrictions on all products used in the combination.

Problems may occur when mixing emulsifiable concentrate (EC) formulations with wettable powder (W), liquid flowable (L), or dry flowable (DF) formulations. These problems can sometimes be prevented by using proper mixing procedures. If using liquid fertilizers, check compatibility in a small lot before mixing a tankful. Fill tanks at least one-fourth full with water or liquid fertilizer before adding herbicides that are suspended. The addition of compatibility agents may be necessary. Wettable powders, DF's, or L's should be

Table 1. Herbicide and Herbicide Premix Names and Restrictions

Trade name	Common (generic) name(s)	RUP	GWA	Key word
AAtrex, atrazine	atrazine	–	+	Caution
Ala-Scept	alachlor + imazaquin	+	+	Danger
Amiben	chloramben	–	–	Caution
Assure	quizalofop	–	–	Caution
Banvel	dicamba	–	–	Warning
Basagran	bentazon	–	–	Caution
Bicep	metolachlor + atrazine	–	+	Caution
Bladex	cyanazine	+	+	Warning
Blazer	acifluorfen	–	–	Danger
Bronco	alachlor + glyphosate	+	+	Danger
Buctril	bromoxynil	+	–	Warning
Buctril/atrazine	bromoxynil + atrazine	+	+	Caution
Bullet	alachlor + atrazine	+	+	Caution
Butyrac 200	2,4-DB	–	–	Danger
Cannon	alachlor + trifluralin	+	+	Warning
Canopy	metribuzin + chlorimuron	–	+	Caution
Classic	chlorimuron	–	–	Caution
Cobra	lactofen	–	–	Danger
Command	clomazone	–	–	Warning
Commence	clomazone + trifluralin	–	–	Danger
Dual	metolachlor	–	+	Caution
Eradicane	EPTC + safener	–	–	Caution
Eradicane Extra	EPTC + extender	–	–	Caution
Evik	ametryn	–	–	Caution
Extrazine	cyanazine + atrazine	+	+	Warning
Freedom	alachlor + trifluralin	+	+	Warning
Fusilade 2000	fluazifop	–	–	Caution
Galaxy	bentazon + acifluorfen	–	–	Danger
Genate Plus	butylate + safener	–	–	Caution
Gramoxone Extra	paraquat	+	–	Danger
Laddok	bentazon + atrazine	–	+	Danger
Lariat	alachlor + atrazine	+	+	Warning
Lasso EC	alachlor	+	+	Danger
Lasso MT	alachlor	+	+	Caution
Lexone	metribuzin	–	+	Caution
Lorox, Linex	linuron	–	–	Caution
Lorox Plus	linuron + chlorimuron	–	–	Warning
Marksman	dicamba + atrazine	–	?	Caution
Many trade names	2,4-D dimethylamine	–	–	Danger
Many trade names	2,4-D ester	–	–	Caution
Option	fenoxaprop	–	–	Warning
Passport	trifluralin + imazethapyr	–	–	Danger
Poast, Poast Plus	sethoxydim	–	–	Warning
Preview	metribuzin + chlorimuron	–	+	Caution
Princep, Simazine	simazine	–	+	Caution
Prowl	pendimethalin	–	–	Warning
Pursuit	imazethapyr	–	–	Caution
Pursuit Plus	pendimethalin + imazethapyr	–	–	Caution
Reflex	fomesafen	–	–	Warning
Rescue	naptalam + 2,4-DB	–	–	Warning
Roundup	glyphosate	–	–	Warning
Salute	metribuzin + trifluralin	–	+	Caution
Scepter	imazaquin	–	–	Caution
Sencor	metribuzin	–	+	Caution
Sonalan	ethalfluralin	–	–	Warning
Squadron	imazaquin + pendimethalin	–	–	Danger
Storm	bentazon + acifluorfen	–	–	Danger
Sutan+	butylate + safener	–	–	Caution
Sutazine	butylate + atrazine	–	?	Danger
Tackle	acifluorfen	–	–	Danger
Tandem	tridiphane	–	–	Warning
Treflan/Trifluralin	trifluralin	–	–	Warning
Tri-Scept	imazaquin + trifluralin	–	–	Danger
Turbo	metribuzin + metolachlor	–	+	Caution

Note: RUP = restricted-use pesticide to be applied by licensed applicator; GWA = ground water advisory; ? = contains atrazine but has no GWA; and key word = toxicity signal, indicates need for extra precautions. The key words "Danger" and "Warning" often indicate pesticides that can irritate skin and eyes, necessitating protective clothing, gloves, and goggles or face shield.

added to the tank and thoroughly mixed before adding ECs. Emulsify ECs by mixing with equal volumes of water before adding them to the tank. Empty and clean spray tanks often enough to prevent accumulation of material on the sides and the bottom of the tank.

The user can apply two treatments of the same herbicide (split application) or can use two different herbicides, provided such uses are registered. The use of one herbicide after another is referred to as a sequential or overlay treatment.

Herbicide rates

Herbicide rates vary according to the time of application, soil conditions, the tillage system used, and the seriousness of the weed infestation. Rates of individual components of a combination are usually lower than rates for the same herbicides used alone.

The rates for soil-applied herbicides usually vary with the texture of the soil and the amount of organic matter the soil contains. For instance, medium-textured soils that have little organic matter require lower rates of most herbicides than do fine-textured soils that have medium to high organic-matter content. For sandy soils, the herbicide label may specify "do not use," "use a reduced rate," or "use a postemergence rather than soil-applied herbicide," depending on the herbicide and its adaptation and on crop tolerance. Postemergence rates often vary depending upon the size and species of the weeds and whether or not an adjuvant is specified.

The rates given in this guide are, unless otherwise specified, broadcast rates for the amount of formulated product. If you plan to band or direct herbicides, adjust the amount per crop acre according to the percent of the area actually treated. Many herbicides have several formulations with different concentrations of active ingredient. Be sure to read the label and make necessary adjustments when changing formulations.

Postemergence herbicide principles

Postemergence herbicides applied to growing weeds generally have foliar rather than soil action; however, some may have both. The rates and timing of applications are based on weed size and climatic conditions. Weeds can usually be controlled with a lower application rate when they are small and tender. Larger weeds often require a higher herbicide rate or the addition of a spray additive, especially if the weeds have developed under droughty conditions. Herbicide penetration and action are usually greater with warm temperature and high relative humidity. Rainfall occurring too soon after application (1 to 8 hours, depending on the herbicide) can cause poor weed control.

Translocated herbicides are most effective at lower spray volumes (5 to 20 gallons per acre), whereas contact herbicides require more complete coverage. Foliar coverage increases as water volume and spray pressure are increased. Spray nozzles that produce small droplets also improve coverage. For contact herbicides, 20 to 40 gallons of water per acre are often recommended for ground application, and a minimum of 5 gallons per acre is recommended for aerial application. Spray pressures of 30 to 60 psi are often suggested with flat-fan or hollow-cone nozzles to produce small droplets and improve canopy penetration. These small droplets are quite subject to drift.

The use of an adjuvant such as a surfactant, crop oil concentrate, or fertilizer solution may be recommended to improve spray coverage and herbicide uptake. These spray additives will usually improve weed control but may increase crop injury. Spray additives may be needed, especially under droughty conditions or on larger weeds.

Crop size limitations may be specified on the label to minimize crop injury and maximize weed control. If weeds are smaller than the crop, basal-directed sprays may minimize crop injury because they place more herbicide on the weeds than on the crop. If the weeds are taller than the crop, rope-wick applicators or recirculating sprayers may be used to place the herbicide on the top of the weeds and minimize contact with the crop. Follow the label directions and precautions for each herbicide.

Conservation tillage and weed control

Conservation tillage allows crop production while it reduces soil erosion by protecting the soil surface with plant residue. Minimum or reduced tillage refers to any tillage system that leaves crop residue on the soil surface. These include primary tillage with chisel plows or disks and the use of field cultivators, disks, or combination tools for secondary tillage. Mulch tillage is reduced tillage which leaves at least 30 percent of the soil surface covered with plant residue.

Ridge tillage and zero tillage are conservation tillage systems with no major tillage prior to planting. In ridge tillage, conditions are often ideal for banding of preemergence herbicides. Cultivation is a part of the system. "No-till" is actually slot tillage for planting with no overall primary tillage. No-till planting conserves moisture, soil, and fuel. It also allows timely planting of soybeans or sorghum after winter wheat harvest.

The elimination of tillage prior to planting means existing vegetation must be controlled with herbicides. The elimination or reduction of herbicide incorporation and row cultivation puts a greater stress and reliance on chemical weed control. Soil conditions must be ideal for single-pass herbicide incorporation to be uniform. Greater emphasis may be placed on preplant or postplant soil-applied herbicides which are not incorporated or foliar-applied (postemergence) herbicides.

Where primary tillage is minimized, soil residual herbicides applied several weeks before planting may reduce the need for a "knockdown" herbicide. However, early preplant (EPP) application may require additional herbicides (preemergence or postemergence) or cultivation for satisfactory weed control after planting. See the corn and soybean sections entitled "Preplant not incorporated" for more information.

Corn and soybeans are the primary crops in Illinois, and they are often planted in a corn and soybean rotation. Modern equipment allows successful no-till planting in corn or soybean stubble. The use of a disk or chisel plow on corn stubble may still provide adequate crop residue to allow minimum tillage. Herbicides are also available to allow a "total postemergence" weed control program, especially for soybeans.

Soybean stubble is often ideal for zero or minimum tillage. Primary tillage is rarely needed and the crop residue should not interfere with herbicide distribution. Early preplant application of preemergence herbicides or the use of postemergence herbicides can often provide adequate weed control.

The existing vegetation in corn and soybean stubble is often annual weeds. If the weeds are small, they can often be controlled prior to planting with herbicides that have both foliar and soil residual activity. For corn, these include atrazine or Bladex and their premixes. For soybeans, metribuzin (Sencor or Lexone), linuron (Lorox), and their premixes with chlorimuron (Preview, Canopy, or Lorox Plus), as well as Pursuit can be used. Foliar activity is enhanced with the addition of crop oil or surfactant.

Sod planting requires a different approach. If minimum or zero-tillage is to be used in perennial grass or legume sods, the sod should be controlled prior to planting. Late control of sod may deplete soil moisture, making crop establishment difficult when soil moisture is low. Some grass sods may require the use of Roundup *in the fall* when there is adequate foliage and translocation for effective control. Bluegrass or clover may be controlled by atrazine alone or combined with Bladex. Clover sods can be controlled by Banvel or 2,4-D applied in the fall (soybeans or corn) or in the spring (corn only) before planting. Alfalfa control usually requires Banvel plus 2,4-D. *Do not plan to take a spring cutting before planting into forage sods.* Regrowth rarely provides sufficient foliage for active herbicide uptake and kill of the sod prior to planting of corn.

Winter cover crops of wheat or rye can be controlled by Roundup prior to planting corn or soybeans, or Gramoxone plus atrazine may be used prior to planting corn.

Annual vegetation over 2 to 3 inches tall at planting time will require a burndown or translocated herbicide. Gramoxone, Roundup, or Bronco can be used with most preemergence herbicides to control existing vegetation.

Gramoxone Extra or Super (paraquat) can be used to control existing vegetation prior to planting. Gramoxone Extra **2.5S** is used at 1.5 to 3 pints per acre. The older Gramoxone Super **1.5S** was used at 1.5 to 2.5 pints per acre, the new 2.5S formulation provides more paraquat per pint and per acre than the older 1.5S. Gramoxone should be applied with a nonionic surfactant in at least 40 gallons of spray per acre. Gramoxone alone often fails to provide adequate control of smartweed, giant ragweed, "marestail" and fall panicum. *Gramoxone is a restricted-use pesticide.*

Roundup (glyphosate) can be used at 3 to 8 pints per acre to control existing vegetation prior to planting. Roundup at the higher rates can translocate to the roots to control some perennials. Spray volume per acre should be 20 to 40 gallons. Small annual weeds can be controlled with 0.75 to 1 pint of Roundup in 5 to 10 gallons of water per acre plus 0.5-percent nonionic surfactant. Do not mix Roundup with Lasso Micro Tech or Bullet.

Bronco (glyphosate plus alachlor) contains the equivalent of 2.6 quarts of Lasso EC and and 1.4 quarts of Roundup per gallon. Bronco is used at 3 to 5 quarts per acre applied in 10 to 30 gallons of water. Application can also be made in UAN nitrogen solutions if annual weeds are less than 6 inches tall. *Bronco is a restricted-use pesticide.*

Banvel (dicamba) may be used in the fall or spring before planting corn or in the fall (*not in the spring*) before planting soybeans. Banvel can control annual and some perennial broadleaved plants including clovers and alfalfa. A combination of Banvel plus 2,4-D can often control more weeds at lower costs.

2,4-D can be used in the fall or spring before planting corn to control broadleaved weeds. The status of 2,4-D prior to planting soybeans is somewhat controversial. See the "preplant not incorporated" portion in the soybean section.

Herbicides for corn

Herbicides mentioned in this section are registered for use on field corn. Some are also registered for silage corn. See Table 2 for registered combinations. Herbicide suggestions for sweet corn and popcorn may be found in Circular 907, *1990 Weed Management Guide for Commercial Vegetable Growers,* which appears in the *1990 Illinois Pest Control Handbook.* Growers producing hybrid seed corn should check with the contracting company or the producer of inbred-seed about tolerance of the parent lines. See Tables 3 and 4 for weeds controlled by the herbicides used in corn.

Preplant not incorporated (corn)

Interest in early preplant application is increasing, especially with the trend toward reduced tillage. Bladex, Banvel, and atrazine have postemergence as well as residual activity. Early weeds such as smartweed can be controlled while they are small, and emergence of other weeds can be curtailed.

Table 2. Registered Herbicide Combinations for Preplant Incorporated (PPI), Preemergence (Pre), or Early Postemergence (EPoE) Application in Corn

	Atrazine	Bladex	Extrazine II	Atrazine + Princep
PPI only				
Eradicane	1	1	1	—
Genate Plus	1	1	1	—
Sutan +	1	1	1	—
PPI or Pre or EPoE				
Used alone	1,2,3	1,2,3	1,2,3	1,2
Dual	1,2,3	1,2	1,2	1,2
Lasso	1,2,3	1,2	1,2	1,2
Prowl	2,3	2,3	–	–

1 = Preplant incorporated
2 = Preemergence
3 = Early postemergence
— = Not registered

With **AAtrex, Dual,** or **Bicep**, preplant surface application may be made using a two-thirds rate as early as 45 days before planting, followed by a one-third rate at planting. A single full-rate application may be made within 30 days before planting. The rates are 4 to 6 pints per ace of AAtrex, 2.5 to 3 pints per acre of Dual, and 4.8 to 7.5 pints per acre of Bicep.

Lariat and Bullet (alachlor plus atrazine) may be used as a preplant plus preemergence 60/40-percent split application on medium- to fine-textured soils. The preplant application may be made up to 45 days before planting. Lariat may also be applied as a single application up to 30 days before planting. *Products containing alachlor are classified as restricted-use pesticides.*

Bladex may be applied early preplant at labeled rates; but if Bladex is applied earlier than 15 days before planting, a split application or use of another herbicide at or after planting is suggested. **Extrazine II** may also be applied 15 to 30 days before planting corn. *These products are restricted-use pesticides.*

Banvel (dicamba) applied before planting no-till corn can control emerged and actively growing broadleaf weeds. Use one pint per acre for medium- and fine-textured soils and one-half pint on coarse soils with over 2-percent organic matter.

Marksman (dicamba plus atrazine) may be used as a preplant treatment in no-till corn. The rate is 3.5 pints per acre on medium- and fine-textured soils that have at least 2-percent organic matter. See the postemergence section for more information.

2,4-D may be used to control existing vegetation in minimum-tillage and no-till situations before planting corn. Many preplant tank-mix labels allow for 1 to 2 pints of 2,4-D LV ester per acre. See the specific label for details.

Buctril, or a tank-mix or premix of Buctril plus atrazine, may be used before planting field corn or grain sorghum, up until just before crop emergence to control emerged annual broadleaf weeds. Apply Buctril alone at 1.0 to 1.5 pints per acre, or Buctril mixed with atrazine at 0.5 to 1.2 pounds of active ingredient. *Buctril is a restricted-use pesticide.*

Roundup may be used preplant to corn or sorghum at three-fourths to one pint (12 to 16 fluid ounces) per acre to control small annual weeds. Use 5 to 10 gallons of water per acre plus a nonionic surfactant. Roundup may be mixed with Banvel or 2,4-D.

Preplant incorporated herbicides (corn)

Some herbicides may be applied prior to planting and incorporated. The time of application will depend upon the label directions and field conditions. Herbicides with sufficient residual activity may be applied

Table 3. Corn Herbicides: Grass and Nutsedge Control

Herbicide	BYG	CBG	FLP	GFT	YFT	WCG	SBR	SHC	WPM	YNS	CRN
Soil-applied											
Atrazine	8	5	3	7	8	4	7	2	3	5	0
Bladex	7	7	8	8	8	6	6	2	6	3	2
Dual	8+	9	8+	9	9	7	7	6	7	7+	2
Eradicane	9	8	9	9	9	7	8	6	7	7	1+
Eradicane Extra	9	9	9	9	9	8	9	8	8+	8	2
Lasso	8+	9	8	9	9	7	7	5	7	7	2
Marksman	4	3	2	3	3	2	1	1	1	4	2+
Princep	8	6	5	7	7	4	5	4	4	2	0
Prowl	8	8	8	8	8	7	7	6	7	0	2+
Sutan+	9	9	9	9	9	8	9	7	7	7	1
Foliar-applied											
Atrazine/oil	8	5	5	7	7	6	7	2	4	6	1+
Bladex	8	7	7	8	8	5	7	2	6	5	1+
Buctril	0	0	0	0	0	0	0	0	0	2	1+
Buctril/atrazine	2	2	0	3	3	0	0	0	0	5	1+
Laddok	2	2	0	3	3	0	2	0	0	8	1
Marksman	2	2	0	2	2	2	2	1	0	3	1+
Tandem/atrazine	9	8	6	8	7	7	7	3	7	6	1+
Tandem/Bladex	9	8	7	8	8	7	7	2	7	5	2+

Note: BYG = barnyardgrass, CBG = crabgrass, FLP = fall panicum, GFT = giant foxtail, YFT = yellow foxtail, WCG = woolly cupgrass, SBR = sandbur, SHC = shattercane, WPM = wild proso millet, YNS = yellow nutsedge, and CRN = corn response.

Table 4. Corn Herbicides: Broadleaf Weed Control

Herbicide	AMG	CCB	JMW	LBQ	BNS	PGW	CRW	GRW	SMW	SFR	VLV
Soil-applied											
Atrazine	9	9	10	9	9	9	9	8	9	8	8
Bladex	8	8	8	9	8	6	9	7	9	7	7
Dual	0	0	4	6	7+	8	5	2	5	0	0
Eradicane	4	2	2	7	4	7	4	3	4	0	5
Lasso	0	0	5	7	7+	9	6	2	5	0	0
Marksman	8	8	8	8	8	9	9	8	9	8	7+
Princep	9	9	9	9	9	9	9	7	9	8	7
Prowl	0	0	2	8	0	9	2	0	3	0	4
Sutan+	4	2	2	4	2	7	4	3	3	0	4
Foliar-applied											
Atrazine/oil	9	9	9	9	9	10	9	8	10	9	9
Banvel	9	9	9	9	8	9	9	9	10	8	7
Bladex	7	8	8	9	9	7	9	7	9	7	7
Buctril	8	9	9	9	9	7+	9	8	8+	9	8
Buctril/atrazine	9	9	10	10	10	10	9	9	10	10	9
2,4-D	9	9	7	9	7	9	9	9	6	8	8
Laddok	8	9	10	9	9	9	9	9	10	10	9
Marksman	9	9	10	10	10	10	9	9	10	9	9
Tandem/atrazine	9	9	9	9	9	10	9	8	10	9	9

Note: AMG = annual morningglory, CCB = cocklebur, JMW = jimsonweed, LBQ = lambsquarters, BNS = black nightshade, PGW = pigweed, CRW = common ragweed, GRW = giant ragweed, SMW = smartweed, SFR = wild sunflower, and VLV = velvetleaf.

Rating Scale and Approximate Weed Control

10 = 95 to 100%, 9 = 85 to 95%, 8 = 75 to 85%, 7 = 65 to 75%, and 6 = 55 to 65%.
Weed control of 5 or less is rarely significant.
Corn injury of 1 or less is rarely significant.
For ratings on herbicide combinations (tank-mix or premix), see the component parts.

Premix:	Grass	+	Broadleaf	Premix:	Broadleaf	+	Broadleaf
Bicep:	Dual	+	atrazine	Buctril/atrazine	Buctril	+	atrazine
Bullet:	Lasso	+	atrazine	Laddok	Basagran	+	atrazine
Extrazine:	Bladex	+	atrazine	Marksman	Banvel	+	atrazine
Lariat:	Lasso	+	atrazine				
Sutazine	Sutan+	+	atrazine				

early preplant. If these herbicides are applied too early, however, weed control may not last as long as desired after planting. Incorporation should distribute the herbicide uniformly throughout about the top 2 inches of soil. *Do not apply preplant herbicides too early or incorporate them too deeply.*

Sutan+, Genate Plus (butylate), Eradicane, and Eradicane Extra (EPTC) contain crop safening agents. Crop injury is unlikely but may occur when growing conditions are unfavorable or when certain hybrids are used. Eradicane Extra also contains an extender to lengthen weed control. These herbicides control annual grass weeds and at higher rates can control or suppress some problem grasses. The rate for Sutan+, Genate Plus, and Eradicane 6.7E is 4¾ to 7⅓ pints per acre. The rate for Eradicane Extra 6E is 5⅓ to 8 pints per acre. Use the higher rates for heavy infestations of shattercane and yellow nutsedge and for johnsongrass.

Application close to planting time is generally preferred to provide the maximum duration of weed control. These herbicides should be incorporated into the soil soon after application, although 4 hours may elapse before incorporation with the high rate and a dry soil.

Sutan+, Genate Plus, Eradicane, or Eradicane Extra may be tank-mixed with atrazine, Bladex, or Extrazine II to improve broadleaf control. The atrazine rate is 2 to 3 pints of 4L or equivalent amounts of 80W or 90WDG per acre. The Bladex rate is 3 to 4 pints of 4L or 2 to 2½ pounds of 80W per acre. The Extrazine II rate is 4 to 6½ pints per acre.

Sutazine 6ME (butylate plus atrazine) contains 4.8 pounds of butylate and 1.2 pounds of atrazine per gallon. The rate is 5.5 to 10.5 pints per acre.

Preplant or preemergence herbicides (corn)

Except for Prowl, the following herbicides may be incorporated. If mechanical incorporation is used, it should be shallow but thorough.

AAtrex, Atrazine (atrazine), or Princep (simazine) may be applied anytime during the 2 weeks before planting or soon after planting. If rainfall is limited, incorporation may aid performance. Corn tolerance to atrazine and simazine is good, but carryover to subsequent crops may occur.

Princep controls fall panicum and crabgrass better than atrazine but is less effective in controlling cocklebur, velvetleaf, and yellow nutsedge. Princep is more persistent than atrazine and less soluble; thus Princep is usually applied preplant. Princep plus atrazine may

Table 5. Soybean Soil-Applied Herbicides: Grass and Nutsedge Control

Herbicide	BYG	CBG	FLP	GFT	YFT	WCG	SBR	SHC	VCN	YNS
Soil-applied "grass"										
Command	9	9	9	9	9	8	7	7	5	3
Dual	8+	9	8+	9	9	7	7	5	0	7+
Lasso	8+	8	8	9	9	7	7	5	0	7
Prowl	9	9	9	9	9	9	8	8	4	0
Sonalan	9	8	9	9	9	8	8	7	4	0
Trefluralin	9	9	9	9	9	9	8	8	5	0
Soil-applied "broadleaf"										
Amiben	8	7	8	8+	8	6	5	6	3	0
Canopy	6	5	6	6	6	5	5	2	3	3
Lexone	6	5	6	6	6	5	5	2	3	2
Lorox	6	6	6	6	6	6	4	4	3	2
Lorox Plus	6	6	6	6	6	6	4	4	4	2
Preview	6	5	6	6	6	5	5	2	3	2
Pursuit	6	7	7	7	6	6	5	7	5	4
Scepter	6	6	6	6	6	5	5	5	7	6
Sencor	6	5	6	6	6	5	5	2	2	2

Note: BYG = barnyardgrass, CBG = crabgrass, FLP = fall panicum, GFT = giant foxtail, YFT = yellow foxtail, WCG = woolly cupgrass, SBR = sandbur, SHC = shattercane, and VCN = volunteer corn, and YNS = yellow nutsedge.

Table 6. Soybean Soil-Applied Herbicides: Broadleaf Control

Herbicide	AMG	CCB	JMW	LBQ	BNS	PGW	CRW	GRW	SMW	SFR	VLV	SBN
Soil-applied "grass"												
Command	0	6	8	9	6	6	8	5	8	4	9+	1
Dual	0	0	4	6	7+	8	5	2	4	0	0	1
Lasso	0	0	5	7	7+	9	6	2	5	0	0	1
Prowl	4	0	2	9	0	9	2	0	4	0	4	1
Sonalan	4	0	2	9	5	9	2	0	4	0	3	2
Trifluralin	4	0	2	9	0	9	2	0	4	0	2	1
Soil-applied "broadleaf"												
Amiben	2	3	5	9	7	9	8	6	8	4	7	1
Canopy	6	9	9	9	6	9	9	7	9	8	9	2
Lexone	3	6	7	9	4	9	8	6	9	7	8	2
Lorox	4	6	5	9	7	9	8	6	9	6	6	2
Lorox Plus	6	8	7	9	7	9	9	7	9	7	7	2
Preview	6	8	9	9	6	9	9	7	9	8	9	2
Pursuit	6	7	8	9	8	9	7	6	9	8	8	1
Scepter	6	9	8	9	8+	9	9	7	9	9	7	1
Sencor	3	6	7	9	4	9	8	6	9	7	8	2

Note: AMG = annual morningglory, CCB = cocklebur, JMW = jimsonweed, LBQ = lambsquarters, BNS = black nightshade, PGW = pigweed, CRW = common ragweed, GRW = giant ragweed, SMW = smartweed, SFR = wild sunflower, VLV = velvetleaf, and SBN = soybean tolerance.

Rating Scale and Approximate Weed Control

10 = 95 to 100%, 9 = 85 to 95%, 8 = 75 to 85%, 7 = 65 to 75%, and 6 = 55 to 65%.
Weed control of 5 or less is rarely significant.
For ratings for combinations (tank-mix and premix), see the component parts.

Premix:	"Grass"	+	"Grass"	Premix:	"Grass"	+	"Broadleaf"
Ala-Scept	Lasso	+	Scepter	Pursuit Plus:	Prowl	+	Pursuit
Cannon:	Lasso	+	Treflan	Salute:	Treflan	+	Sencor
Commence:	Treflan	+	Command	Squadron:	Prowl	+	Scepter
Freedom:	Lasso	+	Treflan	Tri-Scept:	Treflan	+	Scepter
				Turbo:	Dual	+	Sencor
				Passport:	trifluralin	+	Pursuit

be used in 1:1 or 2:1 combinations; the total rate is the same as for atrazine used alone.

The rate for atrazine used alone is 2½ to 3¾ pounds of atrazine 80W, 4 to 6 pints of 4L, or 2.2 to 3.3 pounds of AAtrex Nine-0. Atrazine controls annual broadleaf weeds better than it does grasses, and it is often used at reduced rates in tank-mix combinations to improve broadleaf weed control. The rate for atrazine in some combinations is 1½ to 2 pounds of atrazine 80W, 2 to 3 pints of atrazine 4L, or 1.1 to 1.8 pounds of AAtrex Nine-0. These rates may not provide adequate control of cocklebur, morningglory, and velvetleaf but can reduce the risk of carryover.

You can minimize carryover injury by mixing and applying the herbicides accurately, by applying them early, by using the lowest rates consistent with good

weed control, and by tilling the soil to dilute the herbicide. The risk of carryover is greater after a cool, dry season and on soils with a pH over 7.3.

If you use atrazine at more than 3 pounds of active ingredient per acre (lb a.i./A) or if you apply after June 10, plant only corn or sorghum the next year. If you use atrazine in the spring and must replant, then plant only corn or sorghum that year. Do not plant small grains, small-seeded legumes, or vegetables in the fall or the following spring. Soybeans planted the year after an application of atrazine can also be injured, especially if you use herbicides containing metribuzin.

Bladex (cyanazine) has shorter soil persistence than atrazine, but atrazine has better corn tolerance. Rates of Bladex must be selected accurately on the basis of soil texture and organic-matter content to reduce the possibility of corn injury. The rates per acre for Bladex alone are 1.5 to 6.0 pounds of 80W, 1.35 to 5.3 pounds of 90DF, or 1.25 to 4.75 quarts of 4L. You can lessen the risk of corn injury by using reduced rates of Bladex in combination with other herbicides.

Bladex provides better control of most annual grasses than does atrazine but is weaker than atrazine on several broadleaf weeds, particularly pigweed.

Extrazine II contains cyanazine (Bladex) and atrazine. It is available as 90DF and 4L formulations and can be used preplant incorporated, preemergence, or in tank-mix combinations similar to Bladex. (See Table 2.) Rates must be adjusted carefully to the soil texture and organic-matter content.

Bladex may be tank-mixed with Genate Plus, Sutan+, or Eradicane for preplant incorporation or with Lasso or Dual for preplant or preemergence application. *Bladex and Extrazine II are restricted-use pesticides.*

Lasso (alachlor) or Dual (metolachlor) may be preplant incorporated or applied preemergence at planting time. Preplant incorporation of these herbicides can improve control of yellow nutsedge and can lessen dependence upon rainfall. Incorporation should distribute the herbicide evenly throughout the top 2 inches of soil.

Lasso and Dual control annual grasses and help control yellow nutsedge. You can improve broadleaf weed control by using atrazine, Bladex, or both in either a preplant or a preemergence combination.

Lasso may be applied anytime during the week before planting corn and shallowly incorporated, or it may be used after planting but before the crop and weeds emerge and within 5 days after the last tillage operation. The rate is 2 to 4 quarts of Lasso 4E or 16 to 26 pounds of Lasso 15G per acre. Arena, Judge, Stall, Saddle, and Confidence are private brands of alachlor on the market. *Products containing alachlor are classified as restricted-use pesticides.*

Dual may be applied and shallowly incorporated within 45 days before planting, or it may be used soon after planting. The rates are 1½ to 4 pints of Dual 8E or 6 to 16 pounds of Dual 25G per acre.

Lasso or Dual plus atrazine may be preplant incorporated or applied after planting until corn is 5 inches tall and grass weeds have not passed the two-leaf stage. *Do not apply with liquid fertilizer after the crop emerges.* The suggested rate is 1½ to 4 quarts of Lasso or 1¼ to 2½ pints of Dual 8E plus 1½ to 2½ pounds of atrazine 80W, 1 to 2 quarts of atrazine 4L, or 1.1 to 2.2 pounds of AAtrex Nine-O per acre. Dual is also cleared in a combination with atrazine plus Princep.

Bicep 6L is a 5:4 premix of metolachlor (Dual) plus atrazine used at 1½ to 3 quarts per acre. **Lariat 4L** and **Bullet 4L** are 5:3 premixes of alachlor (Lasso) plus atrazine used at 2½ to 4½ quarts per acre.

Dual or Lasso plus Bladex may be applied before planting and incorporated, or either combination may be applied preemergence at planting. The rate is 2 to 4 quarts of Lasso 4E or 1¼ to 2½ pints of Dual 8E plus 1 to 3¾ pounds of Bladex 80W or 1 to 3 quarts of Bladex 4L per acre. Adjust the rate carefully according to soil texture and organic-matter content.

Preemergence herbicides (corn)

Banvel (dicamba) may be applied immediately after planting, at the rate of one pint per acre on medium- to fine-textured soils having at least 2-percent organic matter. Do not apply preemergence to coarse-textured soils or any soils having less than 2-percent organic matter (4 percent when applied with Lasso). Banvel may be applied preemergence to early postemergence in tank-mix combinations with atrazine, Bladex, Lasso, Dual, or Prowl. **Marksman** is a premix of dicamba (Banvel) with atrazine. Refer to the labels for rates, timing, and precautions when using these combinations.

Prowl (pendimethalin) may be used in corn only after planting: do not incorporate. Corn should be planted at least 1½ inches deep. Prowl can control annual grasses, pigweed, and lambsquarters. The Prowl rate is 1½ to 4 pints alone or 1½ to 3 pints in combination with atrazine or Bladex. Prowl may also be tank-mixed with Banvel and applied to medium or fine soils at a rate of 3 pints of Prowl and ¾ pint of Banvel. These tank-mixes may be applied after corn emergence but before the crop reaches the four-leaf stage and weeds reach the one-inch stage. Avoid postemergence application when corn is under stress from cool, wet weather. Do not apply postemergence in liquid fertilizer.

Postemergence herbicides (corn)

Lasso, Dual, Ramrod, or Prowl may be combined with atrazine for application after planting to very early postemergence. The same is true for Lasso or Dual combined with Banvel. To obtain satisfactory control, apply before grasses reach the two-leaf stage. Early postemergence applications should be made using water, not liquid fertilizer, as a carrier. For more

information, see the section on "Postemergence herbicide principles."

Atrazine may be applied when grass weeds are no more than 1½ inches high. Many annual broadleaf seedlings are more susceptible than grass weeds and may be treated until they are 4 inches tall. For control of some broadleaf weeds, 1.2 pounds active ingredient of atrazine may be sufficient. In most cases, this rate should be increased to 2 pounds for control of annual grass weeds.

The addition of oil-surfactant mixes or surfactants has generally increased the effectiveness of postemergence atrazine. Crop oil concentrates, COC's (80-percent oil and 20-percent surfactant), are used at the rate of one quart per acre.

An atrazine-and-oil mix sometimes injures corn that has been under stress from prolonged cold, wet weather or other factors. Do not use more than 2½ pounds of atrazine 80W, 2 quarts of atrazine 4L, or 2.2 pounds AAtrex Nine-O per acre if you mix with oil or an oil concentrate. *Do not add 2,4-D to the atrazine-oil treatment, or severe injury may result.* Mix the atrazine with water first, and add the oil last. If atrazine is applied after June 10, do not plant any crop except corn or sorghum the next year.

Bladex (cyanazine) may be applied until the fifth leaf of corn is visible and before grass weeds exceed 1.5 inches in height. The rate is 1.5 to 2.5 pounds Bladex 80W or 1.1 to 2.2 pounds Bladex 90DF per acre. *Do not use Bladex 4L postemergence.* Either a tank-mix (Bladex and atrazine) or a premix (Extrazine II) may also be applied postemergence.

Do not apply Bladex alone or with atrazine (tank-mix or premix) postemergence either in cold, wet weather or to corn that is stressed. Injury to corn is more likely under these conditions. Under droughty conditions, certain agricultural surfactants or vegetable oils may be added to Bladex 80W and 90DF. Do not use these spray additives with Extrazine II. Do not use petroleum crop oils or apply Bladex or Extrazine II with liquid fertilizers. Do not apply Bladex or Extrazine II to corn grown for seed. *Bladex and Extrazine II are classified as restricted-use pesticides.*

Tandem (tridiphane) may be used with atrazine, Bladex, or both for postemergence control of both annual grass and broadleaf weeds in field corn. These combinations should be applied when annual grass weeds are in the one- to three-leaf stage and actively growing. The rates per acre are 1 to 1½ pints of Tandem plus 1½ to 4 pints of atrazine 4L (equivalent rates of 80W or 90DF) or 1 to 2½ pounds of Bladex 80W (equivalent rates of 90DF). *Do not use Bladex 4L in combination with Tandem.* Crop oil concentrate (2 pints per acre) should be used with the tank-mixes that do not contain Bladex. Special programs are labeled for control of larger grasses, woolly cupgrass, and wild proso millet. See the Tandem label for more information on these programs.

Banvel (dicamba) may be applied early postemergence when corn is in the spike to five-leaf stage or up to 8 inches tall. The rate is one pint of Banvel per acre on medium- and fine-textured soils or one-half pint on coarse-textured soils. Corn tolerance is better and the potential for drift is less with the early treatment. Banvel may be tank-mixed with Lasso, Dual, Bladex (not 4L), or atrazine and applied early postemergence. See the label for rates, timing, and specific precautions.

Banvel may also be applied at one-half pint per acre to corn more than 8 inches tall but less than 36 inches tall. Weeds should be less than 12 inches tall for best control. Use drop nozzles on corn over 8 inches tall (Banvel alone or with 2,4-D) to improve corn tolerance and improve spray coverage to the weeds. Do not apply Banvel within 15 days of tassel emergence.

To minimize risk of drift injury, do not apply Banvel to corn over 24 inches tall, if nearby soybeans are over 10 inches tall or have begun to bloom. Observe all label precautions concerning spray pressure, spray volume, nozzle selection, wind speed, and temperature in order to minimize risk of vapor or spray drift to nearby susceptible crop or ornamental plants.

Marksman is a 1:2 premix of dicamba (Banvel) and atrazine that may be applied when corn is in the spike to five-leaf stage. The rate is 3½ pints per acre on medium- or fine-textured soils that contain over 2-percent organic matter. Marksman may be tank-mixed with Bladex (not 4L), Dual, Lasso, or Prowl for very early postemergence application. See the label for rates, timing, and precautions. Drift precautions are the same as with Banvel.

If weeds are drought-stressed, the addition of an approved agricultural surfactant to Banvel or Marksman will improve coverage and control. The Banvel (not Marksman) label calls for directed spray application if applied with a surfactant or with 2,4-D. Do not use adjuvants containing penetrants such as petroleum or crop oils because corn injury can be severe.

2,4-D is effective in controlling many broadleaf weeds in corn. If corn is more than 8 inches tall, use drop nozzles to decrease the possibility of injury to the corn. If you direct the nozzles toward the row, adjust the spray concentration so that excessive amounts are not applied to the corn.

The suggested broadcast rate is one-third to one-half pint of ester or one pint of amine for formulations with 3.8 pounds of 2,4-D acid-equivalent per gallon. Use equivalent rates with other formulation concentrations. Use proportionately less 2,4-D when using directed nozzles.

Do not apply 2,4-D to corn from the tasseling stage to the dough stage. After the hard dough to dent stage, you may apply 1 to 2 pints of certain 2,4-D formulations by air or high-clearance equipment to control some broadleaf weeds that may interfere with harvest or to suppress certain perennial weeds. Do not forage or feed fodder for 7 days after treatment.

The ester forms of 2,4-D can vaporize and injure

nearby susceptible plants. This vapor movement is more likely with high-volatile esters than with low-volatile esters. Spray particles of either the ester or the amine form can drift and cause injury.

Corn is often brittle for 7 to 10 days after application of 2,4-D and thus is susceptible to stalk breakage from high winds or cultivation. Other symptoms of 2,4-D injury are stalk bending or lodging, abnormal brace roots, and failure of leaves to unroll. Injury problems are unlikely once corn has reached the brown silk stage.

High temperature and high humidity can increase the potential for 2,4-D injury, especially if corn is growing rapidly. If it is necessary to spray under these conditions, it may be wise to reduce the rate by about 25 percent. Corn hybrids differ in their sensitivity, and the probability of injury increases when corn is under stress.

Buctril (bromoxynil) may be used to control broadleaf weeds in field and silage corn. It is important to treat when the weeds are small. For ground applications, use at least 10 gallons of water per acre, a spray pressure of 30 psi, and flat-fan nozzles.

Buctril does not volatilize and cause the drift injury associated with 2,4-D or Banvel. Under some conditions, Buctril may cause temporary burning of corn leaves. Do not add a surfactant or crop oil to Buctril used alone or in combination.

Buctril 2E rates are 1 to 1½ pints per acre while weeds are in the three- to eight-leaf stage. Corn should be at the three-leaf stage for the low rate and 4-leaf stage for the higher rate. Buctril can be applied to corn up to tassel emergence. Use the higher rate on larger corn and weeds. Although most annual broadleaf weeds are controlled, larger pigweed and velvetleaf may require the higher rate or a combination with atrazine.

Buctril may be tank-mixed with atrazine 4L at one-half to one quart per acre (or equivalent rates of 80W or 90DF). **Buctril/atrazine 3L** is a 1:2 premix used at 1½ to 3 pints per acre. The rate varies with the size of the corn and weeds. Do not apply before the three-leaf stage of corn or after the corn is 30 inches tall. *Buctril is a restricted-use pesticide.*

Laddok (bentazon plus atrazine) is registered for postemergence broadleaf weed control in corn. Laddok does not control grasses. Corn has good tolerance to Laddok.

Laddok is effective mainly through contact action; therefore, weeds must be thoroughly covered with spray. Laddok rates range from 2.5 to 3.5 pints per acre. Always add UAN (urea ammonium nitrate) solution or an oil concentrate to Laddok. For ground application, use one gallon per acre of UAN solution; and, for aerial application, use one-half gallon per acre. If UAN solution is not used, a nonphytotoxic oil concentrate should be added to the spray tank.

Use the oil concentrate if Canada thistle or yellow nutsedge is to be treated. For ground application, use no more than 2 pints per acre of the oil concentrate; and, for aerial application, use no more than 1 pint per acre.

Laddok provides better control of velvetleaf, annual morningglory, lambsquarters, and pigweed than does Basagran alone and will create less risk of carryover than do higher rates of atrazine alone.

Roundup (glyphosate) may be applied as a spot treatment in corn prior to silking. For applications made on a spray-to-wet basis, use a 1- to 2-percent solution of Roundup in water. Avoid contact of spray with the corn.

Postemergence soil-applied herbicides (corn)

Some soil-applied herbicides may be applied to the soil as a postemergence treatment in corn. It may be necessary to use drop nozzles to avoid interference from corn leaves and ensure uniform application to the soil.

Prowl (pendimethalin) or Treflan (trifluralin) may be applied to the soil and incorporated after field corn is 4 inches tall (for Prowl) or 8 inches tall (for Treflan) and up to the time of the last cultivation. The field should be cultivated to control existing weeds and cover the roots at the base of the corn before application. The herbicide should then be thoroughly and uniformly incorporated into the top inch of the soil with a sweep-type or rolling cultivator. Prowl may not require incorporation if irrigation is used or rainfall occurs soon after application. Prowl or Treflan may be combined with atrazine.

These Prowl or Treflan treatments may help control late-emerging grasses such as shattercane, wild proso millet, fall panicum, or woolly cupgrass.

Dual (metolachlor) or Bicep (metolachlor plus atrazine) may be used for postemergence "lay-by" treatments in corn. For Dual, as much as 3 pounds of active ingredient per acre may be used in a single application, up to a total of 6 pounds of active ingredient in one year. With Bicep, as much as 3 quarts of 6L may be used per acre.

Directed postemergence herbicides (corn)

Directed sprays are sometimes needed for emergency situations, especially when grass weeds become too tall to be controlled by cultivation. Weeds, however, are often too large for directed sprays to be effective. Directed sprays cannot be used on small corn because a height difference between corn and weeds is needed to keep the spray off the corn. The spray may kill corn leaves that come into contact with it, and injury can affect yields. *Consider these to be emergency treatments.*

Lorox or Linex (linuron) may be applied as a directed spray after corn is at least 15 inches tall (freestanding) but before weeds are 8 inches tall, preferably when weeds are no more than 5 inches tall. Linuron controls broadleaf and grass weeds.

The broadcast rate is 1¼ to 3 pounds of linuron 50W or 50DF or 1¼ to 3 pints of 4L per acre, depending on weed size and soil type. Add Surfactant WK at the rate of 1 pint per 25 gallons of spray mixture. Cover the weeds with the spray, but keep it off the corn as much as possible.

Evik 80W (ametryn) is registered for directed use when corn is more than 12 inches tall and weeds are less than 6 inches tall. Evik should not be applied within 3 weeks of tasseling. The rate is 2 to 2½ pounds Evik 80W per acre (broadcast) plus 2 quarts of surfactant per 100 gallons of spray mixture. Extreme care is necessary to keep the spray from contacting the leaves.

Gramoxone Extra (paraquat) may be applied as a directed spray after corn is 10 inches tall but before weeds are 4 inches tall. The rate is 12.8 fluid ounces of Gramoxone Extra per acre in 20 to 40 gallons of water. Add 1 quart of nonionic surfactant per 100 gallons of spray volume. Control of broadleaf weeds such as smartweed can be improved by adding 1 to 2 pints per acre of atrazine 4L (or equivalent rates of 80W), Bladex, or Princep. Observe all label precautions. *Gramoxone is a restricted-use pesticide.*

Herbicides for sorghum

Many herbicides used to control weeds in corn may also be used in sorghum.

Bronco (alachlor plus glyphosate) may be used alone or with atrazine where grain sorghum is to be planted directly into a cover crop or in the residue of the previous crop. Bronco can control emerged annual weeds and may control or suppress many emerged perennial weeds, as well as give preemergence grass control. Grain sorghum seed must be treated with Screen (flurazole), as it is when Lasso is used. *Bronco is a restricted-use pesticide.*

Gramoxone Extra or Super (paraquat) can control existing annual weeds where grain sorghum is to be planted into the residue of the previous crop. *Gramoxone is a restricted-use pesticide.*

Atrazine may be used for weed control in sorghum (grain and forage types) or sorghum-sudan hybrids, with application made preemergence or postemergence. A preplant surface application may be made using a single application within 30 days of planting or a two-thirds plus one-third split application within 45 days of planting. Plant the seed at least one inch deep. Do not use preplant or preemergence on soils with less than 1-percent organic matter. Atrazine can cause injury to sorghum if rainfall occurs before or shortly after sorghum emergence.

Injury may also occur when sorghum is under stress from unusual soil or weather conditions or when rates are too high. The rate of application for preplant and preemergence is 2 to 3 pounds of atrazine 80W per acre. The postemergence rate is 4 to 6 pints 4L per acre without crop oil or 2.4 pints 4L (broadleaf control only) with crop oil or crop oil concentrate. Use equivalent rates of atrazine 80W or AAtrex 90DF formulations. Rotational crop recommendations and weed control are the same as for atrazine used in corn. Failure to control fall panicum has been a major problem.

Ramrod (propachlor) may be used alone or in combination with atrazine or Bladex for sorghum. Ramrod can improve grass control; but rates must not be maintained, especially on soils that are relatively low in organic matter. Do not graze or feed forage to dairy animals.

Lasso (alachlor) alone or plus atrazine may be preplant incorporated or used preemergence for grain sorghum if seed is treated with Screen (flurazole). This use also applies to Lariat and to Bronco. *Products containing alachlor are restricted-use pesticides.*

Dual (metolachlor) or Bicep (metolachlor plus atrazine) may be used for sorghum if seed has been treated with Concep II. These herbicides will control grasses better than will atrazine applied alone. An early preplant treatment of Dual or Bicep may be used in a similar manner as for corn, but it is still necessary to use seed that has been treated with Concep II.

Laddok (bentazon plus atrazine) is registered for postemergence broadleaf weed control in sorghum in a similar manner as for corn. (See the section entitled "Herbicides for corn.") Adding 28-percent UAN solution or crop oil concentrate is considered relatively safe. Do not apply Laddok to grain sorghum that is heading or blooming. Laddok use rates range from 2.5 to 3.5 pints per acre.

2,4-D may be applied postemergence for broadleaf control in sorghum that is from 4 to 24 inches tall. Use drop pipes on nozzles if sorghum is more than 8 inches tall. Rates are similar to those for corn. (See the section entitled "Herbicides for corn.")

Banvel (dicamba) may be applied postemergence to sorghum up to 21 days after emergence but before sorghum is 15 inches tall. The rate is one-half pint per acre. Do not graze or feed treated forage or silage before the mature grain stage. Sorghum can be injured by Banvel, and seed development can be affected.

Buctril (bromoxynil) can control small broadleaf weeds in grain sorghum from the three-leaf up to the boot stage. A tank-mix with atrazine or the Buctril/atrazine mixture may be used. See the label for rates, timing, and weed sizes. *Buctril is a restricted-use pesticide.*

Prowl (pendimethalin) may be applied to grain sorghum from the 4-inch growth stage until the last cultivation, primarily for control of late-season annual grass weeds. For more information, see the subsection on postemergence soil-applied herbicides under "Herbicides for corn."

Roundup (glyphosate) may be applied as a spot treatment in sorghum (milo) prior to heading. For applications on a spray-to-wet basis, use a 1- to 2-percent solution of Roundup in water. With motorized

spot treatments from which less complete coverage of weeds may result, use a 5-percent solution. Avoid spray contact with the sorghum.

Herbicides for soybeans

Consider the kinds of weeds expected when you plan a herbicide program for soybeans. The herbicide selectivity table lists herbicides and their relative weed control ratings for various weeds. (See Tables 7 to 10 for soybean herbicides.)

Although soybeans may be injured by some herbicides, they usually outgrow early injury with little or no effect on yield if stands have not been significantly reduced. Significant yield decreases can result when injury occurs during the bloom to pod-fill stages. Excessively shallow planting can increase the risk of injury from some herbicides. Accurate rate selection for soil type is essential for herbicides containing metribuzin (Canopy, Lexone, Preview, Salute, Sencor, or Turbo) or linuron (Linex, Lorox, or Lorox Plus). Do not apply these herbicides after soybeans begin to emerge, or severe injury can result. Always follow label instructions. See Table 7 for some preplant and preemergence tank-mix combinations.

Preplant not incorporated (soybeans)

Early preplant application of herbicides can be used in many minimum tillage programs to minimize existing vegetation problems at planting and reduce the need for a knockdown herbicide. Preemergence herbicides for early application before planting soybeans are Dual for grass control and Canopy, Lexone, Lorox Plus, Preview, Pursuit, Sencor, and Scepter for broadleaf control. All except Dual have both soil and foliar activity, so they may control some small annual weeds prior to planting soybeans, especially if a nonionic surfactant or crop oil concentrate is added to the spray mix. However, if weeds are over 1 to 2 inches tall, add either Gramoxone, Roundup, or Bronco to the spray mix to control existing vegetation. (See the section "Conservation tillage and weed control.")

Dual can be applied up to 30 days prior to planting or as a split application within 45 days of planting soybeans. The split application rate is a full rate with two-thirds applied preplant and one-third at planting.

Canopy, Lorox Plus, and Preview can be applied early preplant up to 30 days before planting soybeans. However, if applied with Dual, this is reduced to 14 days and with Lasso, to 7 days.

Sencor plus Lasso or Dual may be applied up to 30 days before planting soybeans if applied as a split preplant and at planting application. **Turbo** is a premix of Sencor and Dual.

Pursuit, Pursuit Plus, Passport, Scepter, and Squadron can be applied up to 45 days before planting soybeans. However, if sufficient rain does not occur before planting, then mechanical incorporation is required.

Roundup and Poast can also be used before planting soybeans. Roundup may be used preplant in soybeans

Table 7. Herbicide Tank-Mixes for PPI or PRE Use in Soybeans

Herbicide	Sencor or Lexone	Canopy or Preview	Scepter*	Pursuit	Command	Amiben
PPI						
Cannon	1	1	1	–	1	–
Command	1	1	1	–	–	–
Commence	1	1	1	–	–	–
Freedom	1	1	1	–	1	–
Salute	–	–	1	–	1	–
Sonalan	1	1	–	–	1	1
Trifluralin	1	1	1	1	1	1
PPI or Pre						
Dual	1,2	1,2	1,2	1,2	1	1,2
Lasso	1,2	1,2	1,2	1,2	1	1,2
Prowl	1,2	1,2	1,2	1,2	1	1,2
Turbo	–	–	1,2	–	1	–

	Sencor + Scepter*	Sencor + Command	Command + Scepter*	Lorox or Linex	Lorox+	Treflan
PPI Only						
Command	–	–	–	–	–	1
Sonalan	–	1	–	–	1	–
Treflan	1	1	1	–	1	–
PPI or Pre						
Dual	1,2	1	1	2	1,2	1
Lasso	1,2	1	1	2	1,2	1
Prowl	1,2	1	1	2	2	–

* Only in Scepter label's "southern use area."
Note: 1 = preplant incorporated, 2 = preemergence, and – = not registered.

Table 8. Soybean Herbicides and Crop Rotation Restrictions

Herbicide	pH	FC	SC	GS	WT	OT	RY	ALF	CLO
				(Months after application prior to)					
Canopy	≤6.8	10	18	12	4	18	18	10	12
Classic	≤7.0	9	**	9	3	3	3	9	9
Command	–	9	9-12	9	12	16	16	16	16
Commence	–	9	9	9	12	16	16	16	16
Lorox Plus	≤6.8	10	18	10	4	4	4	**	12
Preview	≤6.8	10	18	12	4	4	4	10	12
Reflex	–	10	10	18	4	4	4	18	18
Pursuit##	–	9.5	18	18	4	18	18	18	18
Scepter (northern area) (1/3 pint/A post)	–	11*	18	11	4	4	18	18	18
Scepter (northern area)# (2/3 pint/A)	–	18	18	11	16	16	16	18	18
Scepter (southern area)#	–	11*	18	11	4*	11	18	18	18

Applies also to Squadron, Tri-Scept, and Ala-Scept.
Applies also to Pursuit Plus and Passport.
* 15 inch rainfall restriction.
** Bioassay after 9 months.
Note: pH = soil pH restrictions, FC = field corn, SC = seed corn, GS = grain sorghum, WT = wheat, OT = oats, RY = rye, ALF = alfalfa, and CLO = clover.

to control small annual weeds. The rate is 0.75 to 1 pint per acre in 5 to 20 gallons of water with the addition of a surfactant. Poast can be used at 0.5 pint per acre before planting soybeans to control small annual grasses. Always add crop oil concentrate or Dash with Poast.

2,4-D application prior to planting soybeans is controversial. Poast labeling allows preplant application with 2,4-D LVE, but the label states, "Do not plant soybeans for 3 months after treatment or until the 2,4-D LVE has *disappeared* from the soil." Canopy, Lorox Plus, Preview, Sencor, and Turbo labels allow tank-mixing with 2,4-D LVE when applied 30 days before planting soybeans. Yet, these labels allow twice the rate of 2,4-D as on the Poast label. A residue tolerance for 2,4-D in soybeans has not been established. There is *no 2,4-D label allowing use in the spring prior to planting soybeans.* The legality of these treatments as used is questionable.

Soil-applied "grass" herbicides (soybeans)

Treflan, Sonalan, and Command are soil-applied herbicides for grass control which require mechanical incorporation, while Prowl, Lasso, and Dual can be used preemergence or preplant incorporated. Incorporation improves herbicide performance if rainfall is limited. For more information, see the section entitled "Herbicide incorporation."

Treflan, Sonalan, and Prowl are dinitroaniline (DNA) herbicides which control annual grasses, pigweed, and lambsquarters. Control of additional broadleaf weeds requires combinations (see Tables 6 and 7) or sequential treatments with other herbicides.

Soybeans are sometimes injured by DNA herbicides. Symptoms are stunting, swollen hypocotyls, and short, swollen lateral roots. Usually, such injuries are not serious. If incorporation is too shallow or Prowl is used preemergence, soybean stems may be calloused and brittle, leading to lodging or stem breakage.

DNA herbicides can sometimes carry over and injure rotational crops of corn or sorghum. Symptoms appear as reduced stands and stunted, purple plants with poor root systems. Under good growing conditions, corn typically recovers from this early season injury. Accurate, uniform incorporation is needed to minimize potential carryover.

Treflan, Trilin, or Trifluralin (trifluralin) may be applied alone anytime in the spring prior to planting. However, tank-mixes may specify application closer to soybean planting. Incorporate trifluralin within 24 hours after application or within 8 hours if the soil is warm and moist. The rate per acre is 1 to 2 pints of 4E or equivalent rates of Pro-5 or 10G. A slightly higher rate and deeper incorporation may be specified for shattercane control.

Sonalan 3E (ethalfluralin) may be applied at 1.5 to 3 pints per acre within 3 weeks before planting and should be incorporated within 2 days after application. There is a greater risk of soybean injury from Sonalan than with trifluralin, so incorporation must be uniform. Sonalan is less likely than trifluralin to carry over and injure corn the following year.

Prowl 4E (pendimethalin) may be applied at 1 to 3 pints per acre up to 60 days (less for some tank-mixes) before planting soybeans. Preplant treatments should be incorporated within 7 days unless adequate rainfall occurs to incorporate the herbicide. *South of Interstate 80,* Prowl may also be applied preemergence up to 2 days after planting.

Command 4E (clomazone) is used at 1.5 to 2 pints per acre to control annual grasses, velvetleaf, and several other broadleaved weeds. Use the higher rate if Command is applied more than 30 days prior to planting. Command is also used at lower rates in some tank-mixes for velvetleaf control (see Table 7). **Commence 5.25L** is a premix of Command and Treflan used at 1.75 to 2.67 pints per acre.

Incorporate Command or Commence immediately if the soil is moist or within 8 hours after application

Table 9. Soybean Postemergence Herbicides: Broadleaf Weed Control

Herbicide	AMG	CCB	JMW	LBQ	BNS	PGW	CRW	GRW	SMW	SFR	PSI	VLV	SBN
Contact postemergence broadleaf													
Basagran	4	9+	9	6	3	4	7	8	9	8	8	8+	0
Blazer/Tackle	8	7	9	5	8	10	9	8	9	7	2	6	2
Galaxy	6	9	9	6	6	9	8	8	9	8	7	8+	1
Storm	7	8+	9	5	7	9	9	8	9	8	6	8	1+
Cobra	7	8+	9	4	8	10	9	8	6	8	6	7	3
Reflex	7	7	9	5	7	9	8	6	7	7	2	6	1
Systemic postemergence broadleaf													
Classic	7	9+	8+	2	3	9	8	7	8	9	4	7	1
Pinnacle	4	6	4	8+	4	8+	4	4	8	6	4	8+	1+
Classic and Pinnacle	6	9+	8+	8+	4	9	6	5	8	8	4	8+	1+
Pursuit	7	8+	7	4	8	9	6	8	8	9	6	8+	1
Scepter	2	9+	4	3	5	10	6	3	6	7	2	3	1
Rescue	7	8	4	4	3	4	3	7	5	6	2	3	4

Note: AMG = annual morningglory, CCB = cocklebur, JMW = jimsonweed, LBQ = lambsquarters, BNS = black nightshade, PGW = pigweed, CRW = common ragweed, GRW = giant ragweed, SMW = smartweed, SFR = wild sunflower, PSI = prickly sida, VLV = velvetleaf, and SBN = soybean response.

Table 10. Postemergence Herbicide Tank-Mixes

	Basagran	Blazer	Tackle	Reflex	Cobra	Classic
Registered for broadleaf weed control in soybeans						
Basagran	–	X	X	X	X	X
Classic	X	X	X	X	X	–
Scepter	X	X	X	X	X	–
Pinnacle	–	–	–	–	–	X
Rescue	–	X	X	–	–	–
2,4-DB	X	X	X	X	X	X
*Registered for grass + broadleaf weed control in soybeans**						
Assure	X	–	–	–	–	X
Fusilade	X	X	X	X	–	–
Option	X	X	X	–	–	–
Poast Plus	X	X	X	–	–	–

* Check labels for special instructions. Sequential application may be preferable (see below).
Note: X = registered and – = not registered.

if the soil is dry. You must minimize drift (spray or vapor) to sensitive plants. Avoid applying within 100 feet of trees, ornamentals, vegetables, alfalfa, or small grains or within 1,000 feet of subdivisions or towns, nurseries, greenhouses, and commercial fruit or vegetable (except sweet corn) production areas.

Minimum recropping intervals are 9 months for field corn or sorghum and 12 months for wheat. See Table 8 or the label for more information. Carryover injury will appear as whitened or bleached plants after emergence. Corn has usually outgrown modest injury with little effect on yield. However, injury may be severe if application or incorporation is not uniform. Corn hybrids vary in tolerance to clomazone.

Dual (metolachlor) and Lasso (alachlor) can be applied preplant or preemergence to control annual grasses and pigweed. Use the higher rates to improve black nightshade control and incorporate to improve yellow nutsedge control. They can be combined with other herbicides to improve broadleaf control (see Tables 6 and 7). Dual can be applied up to 30 days prior to planting soybeans. The rate per acre is 1.5 to 3 pints of 8E or 6 to 12 pounds of 25G. Lasso can be applied up to 7 days prior to planting soybeans. The rate per acre is 2 to 4 quarts of 4E or 4L (MicroTech), or 16 to 26 pounds of 15G. Arena, Judge, Stall, Saddle, and Confidence are private brands of alachlor in the market. *All herbicides containing alachlor are restricted-use pesticides.*

Cannon and Freedom are premixes of alachlor (Lasso) and trifluralin (Treflan). They control the same weeds as Lasso (see Tables 5 and 6), but require incorporation within 24 hours because of the trifluralin. *Cannon 3E* is for darker, heavier soils at a rate of 3 to 5 quarts per acre. *Freedom 3E* is for lighter soils such as occur in southern Illinois, and the rate is 2.75 to 4.5 quarts per acre. *Cannon and Freedom are restricted-use pesticides.*

Soil-applied "broadleaf" herbicides (soybeans)

Amiben, Canopy, Command, Lexone, Lorox, Lorox Plus, Preview, Pursuit, Scepter, and Sencor are soil-applied herbicides used for broadleaf weed control in soybeans. Lorox is not to be incorporated and Command must be incorporated (Command is discussed in the "grass" herbicide section). The others can be used preplant incorporated or preemergence after planting soybeans.

Timely rainfall or incorporation is needed for uniform herbicide placement in the soil. Incorporation may improve control of deep-germinating (large-seeded) weeds especially when soil moisture is limited. Accurate and uniform application and incorporation are essential to minimize potential soybean injury. Except for Amiben and Command, these herbicides are photosynthetic inhibitors (PSI), meristematic inhibitors (MSI), or premixes of MSI (chlorimuron) and PSI's (metribuzin or linuron).

Photosynthetic (PSI) inhibitors

Metribuzin (Sencor or Lexone) and linuron (Lorox or Linex) are photosynthetic inhibitors (PSI). Canopy, Preview, Salute, and Canopy are premixes which contain metribuzin while Lorox plus is a premix which contains linuron. These PSI herbicides can cause soybean injury from foliar or soil uptake, *so do not apply them after soybeans emerge.*

PSI herbicide injury symptoms are yellowing (chlorosis) and dying of lower soybean leaves usually appearing about the first trifoliolate stage. Atrazine and simazine carryover can intensify these symptoms. Soybeans usually recover from moderate PSI injury that occurs early. Metribuzin injury may be greater on soils with pH over 7.5. Soybean varieties differ in their sensitivity to metribuzin.

Sencor or Lexone (metribuzin) may be applied anytime within 14 days before planting soybeans. The Sencor or Lexone rate per acre used in tank-mixes is ½ to 1 pint of 4L or ⅓ to ⅔ pound of 75DF. Accurately adjust the rates according to soil texture and organic matter content. *Do not apply to sandy soil that is low in organic matter.* Reduced rates minimize soybean injury but lessen weed control. Split preplant and preemergence applications allow higher rates to improve weed control. Sencor or Lexone can control several annual broadleaves (see Table 6) and can be tank-mixed with many herbicides to improve control of other species (see Table 7).

Turbo 8E, a premix of metribuzin (Sencor) plus metolachlor (Dual), can be applied preplant incorporated or preemergence. The rate per acre is 1.5 to 3 pints.

Salute 4E, a premix of metribuzin (Sencor) plus trifluralin (Treflan), is applied preplant at 1.5 to 3 pints per acre and must be incorporated within 24 hours.

Preview 75DF and Canopy 75DF are premixes of metribuzin (Lexone) and chlorimuron (Classic) while **Lorox Plus** 60DF is a premix of linuron (Lorox, see below) and chlorimuron (Classic). These premixes may be applied preemergence or preplant incorporated. They control cocklebur, velvetleaf, and wild sunflower better than metribuzin or linuron alone (see Table 6). Combinations with the grass herbicides can improve grass control (see Tables 5 and 7). Preview and Canopy contain significant amounts of chlorimuron (Classic) as well as metribuzin, so they can provide some burndown of small weeds as well as residual control for minimum tillage systems.

Broadcast rates per acre are 6 to 10 ounces of Preview 75DF, 4 to 7 ounces of Canopy 75DF, and 12 to 28 ounces of Lorox Plus 60DF. *Do not apply Preview, Canopy, or Lorox Plus to soils with pH greater than 6.8.* High soil pH may occur in localized areas in a field. Correct rate selection for the soil plus uniform, accurate application and incorporation are essential to minimize soybean injury and potential follow crop injury. See PSI injury symptoms (above) and MSI injury symptoms (below).

Minimum recropping intervals for Preview, Canopy, and Lorox Plus are 4 months to wheat and 10 months to field corn. If Classic, Pursuit, or Scepter is applied the same year as Preview, Canopy, or Lorox Plus, the risk of carryover can increase so labels should be checked carefully for rotational guidelines.

Lorox or Linex (linuron) is used after planting soybeans and before the crop emerges. Lorox is best suited to the silt loam soils of southern Illinois that contain 1- to 3-percent organic matter where the rate per acre is 1 to 1⅔ pounds (50DF) or pints (4L) per acre. *Do not apply to very sandy soils or soils containing less than 0.5 percent organic matter.*

Meristematic inhibitors (MSI)

Imazethapyr (Pursuit), imazaquin (Scepter), and chlorimuron (in Canopy, Preview, and Lorox Plus, see above) are meristematic inhibitors (MSI).

MSI herbicide injury symptoms include temporary yellowing of upper leaves (golden tops) and shortened internodes of soybeans. Although plants may be stunted, yield is generally not affected. These MSI herbicides may carry over and injure certain sensitive follow crops. Symptoms on corn or grain sorghum are stunted growth, inhibited roots, and interveinal chlorosis or purpling of leaves. Symptoms on small grains are stunted top growth and excess tillering.

Pursuit 2E (imazethapyr) is used at 4 fluid ounces per acre (32 acres per gallon) to control broadleaved weeds (see Table 6). Velvetleaf and jimsonweed control are more consistent with incorporation. Grass control is improved by tank-mixing Pursuit with a grass herbicide (see Table 7). **Pursuit Plus and Passport** are both premixes of Pursuit and Prowl or trifluralin, respectively. Both are used at 2.5 pints per acre, which is equivalent to 0.25 pint of Pursuit and 1.75 pint of Prowl or 1.5 pints of trifluralin, respectively.

Pursuit and Pursuit Plus can be applied up to 45 days prior to planting soybeans. If sufficient rain does not occur before planting, then mechanically incorporate. *South of Interstate 80,* Pursuit Plus can be surface-applied up to 2 days after soybean planting. Minimum recropping intervals for Pursuit, Pursuit Plus, and Passport are 4 months for wheat, 9.5 months for field corn, and 18 months for grain sorghum. Pursuit has less potential than Scepter to injure corn

the next season on high organic matter soils, and it provides better control of velvetleaf. Thus, Pursuit is more adapted than Scepter to most soils of central and northern Illinois.

Scepter (imazaquin) is used at ⅔ pint 1.5E or 2.8 ounces of 70DG per acre and is applied within 45 days (less with many tank-mixes) before planting or immediately after planting. Scepter controls many broadleaf weeds such as pigweed and cocklebur (see Table 6) with adequate soil moisture, but it is somewhat weak on velvetleaf. Incorporation can improve weed control under low-rainfall conditions, and may improve control of velvetleaf and giant ragweed. Grass control is improved by mixing with "grass" herbicides (see Table 7).

Squadron, Tri-Scept, and Ala-Scept are premixes of imazaquin (Scepter) plus pendimethalin (Prowl), trifluralin, or alachlor (Lasso), respectively. The rate per acre is 3 pints of Squadron, 2.33 pints of Tri-Scept, or 5.33 pints of Ala-Scept. This is the equivalent of ⅔ pint of Scepter plus 1.5 pint of Prowl, 1.5 pint of trifluralin, or 2 quarts of Lasso per acre, respectively. Incorporate Squadron within 7 days unless sufficient rain occurs. Tri-Scept must be incorporated within 24 hours. Ala-Scept can be used preemergence or preplant incorporated.

A line across Peoria, extending west along Illinois Route 116 and east along U.S. Route 24, presently determines Scepter, Squadron, Tri-Scept, or Ala-Scept rotational crop restrictions (see Table 8).

There have been significant problems with carryover of Scepter and related premixes and tank-mixes in Illinois. Soil and climatic conditions plus lack of uniformity in application and incorporation are associated with the carryover problem. Carryover potential is greater on soils with high organic matter and low pH. *Research and field results indicate that in Illinois, Scepter, Squadron, and Tri-Scept are best adapted to the soils and weeds south of Interstate 70.* Reduced rates, which can reduce potential carryover, are allowed for postemergence use of Scepter and in tank-mixes with several other products. However, problems have arisen in determining corporate responsibility for product liability when Scepter has been used at reduced rates in tank-mixes.

Other "broadleaf" herbicides

Amiben (chloramben) can be used preemergence or preplant incorporated. Amiben is often applied as a band treatment after planting to control broadleaved weeds following a preplant application of a herbicide to control annual grasses. If rain does not occur within 3 to 5 days after preemergence application of Amiben, a rotary hoe should be used over the field. The broadcast rate of Amiben alone is 20 to 30 pounds of 10G, 4 to 6 quarts of 2S, or 2.4 to 3.6 pounds of 75DS per acre. Use the higher rate for control of black nightshade, common ragweed, velvetleaf, and annual grasses. Amiben generally performs best on the soils of moderate to high organic matter.

Command (clomazone) is often used as a broadleaf herbicide in tank-mixes, but it also controls annual grasses. See discussion under soil-applied "grass" herbicides.

Postemergence herbicides (soybeans)

Postemergence (foliar) herbicides are more effective when used in a planned program so that application is timely and not just an emergency or rescue treatment. Foliar treatments allow the user to identify the problem weed species and choose the most effective herbicide. Climatic conditions greatly affect foliar herbicides as penetration and action are usually greater with warm temperatures and high relative humidity. Rainfall soon after application can cause poor weed control. Weeds growing under droughty conditions are more difficult to control.

Rates and timing for foliar treatments are based on weed size. Early application when weeds are young and tender may allow the use of lower herbicide rates. Treatment of oversized weeds may only suppress growth temporarily and regrowth may occur. A cultivation 7 to 14 days after application but before regrowth can often improve weed control. However, cultivation during or within 7 days of a foliar application may cause erratic weed control.

Crop oil concentrates (COC) or nonionic surfactants (NIS) are usually added to the spray mixture to improve effectiveness of postemergence soybean herbicides. Dash is a special surfactant for use with Poast. Fertilizer adjuvants such as 28-0-0 (UAN) or 10-34-0 may be specified on the label to increase control of certain weed species, such as velvetleaf. *Do not use brass or aluminum nozzles with fertilizer adjuvants. All fertiilzer adjuvants should be rinsed from the tank before final cleanup with chlorine bleach.*

Postemergence herbicides for soybeans are either contact or translocated in action. Contact herbicides affect only the leaf tissue covered by the spray, so thorough spray coverage is critical. Contact herbicides should be applied to small weeds. Injury symptoms are usually noticeable within a day. Translocated herbicides do not require complete spray coverage as they move to the growing points (meristems) after foliar penetration. Their action is slow and symptoms may not appear for about a week.

Contact broadleaf herbicides

Basagran, Blazer, Tackle, Reflex, Cobra, Galaxy, and Storm are contact broadleaf herbicides. See Table 9 for weeds controlled. Spray volumes for ground application are 20 to 30 gallons per acre and spray pressure should be 40 to 60 psi. Hollow cone or flat-fan nozzles provide much better coverage than flood nozzles.

Low temperatures and humidity will reduce contact

activity. Soybean leaves may show contact burn under conditions of high temperature and humidity. This leaf burn is intensified by crop oil concentrate or Dash. Soybeans usually recover within 2 to 3 weeks after application. A rain-free period of several hours is required for most effective control with most contact herbicides.

Smaller weeds that are actively growing may allow the use of reduced herbicide rates. Contact herbicides have little soil residual activity, so don't apply too early. Apply 2 to 3 weeks after soybean emergence or when soybeans are in the 1- to 2- trifoliolate stage. Larger weeds not only require increased rates, but the weeds may recover and regrow. Contact herbicides should not be applied after soybeans begin to bloom. Preharvest intervals are generally 50 to 90 days.

Basagran (bentazon) is used at 1 to 2 pints per acre. See the label for specifics on weed sizes and rates. Most weeds should be small (1 to 3 inches) and actively growing. Basagran controls cocklebur, smartweed, jimsonweed, and velvetleaf. Velvetleaf control is improved if 28-0-0 (UAN) is added to the spray mixture. Crop oil concentrate is preferred if the major weed species is common ragweed or lambsquarters. Split applications can improve control of lambsquarters, giant ragweed, wild sunflower, and yellow nutsedge. The addition of 2,4-DB can improve annual morningglory control. Do not spray if rain is expected within 8 hours.

Blazer or Tackle (acifluorfen) is used at 1 to 3 pints per acre when broadleaf weeds are 2 to 4 inches tall and actively growing. See the label for specifics on adjuvants and weed sizes. Weeds controlled include pigweed, annual morningglory, jimsonweed, and black nightshade. Velvetleaf control is improved with the use of fertilizer adjuvants or the addition of Basagran. Adding 2,4-DB can improve cocklebur and morningglory control. Blazer and Tackle may cause soybean leaf burn, especially if applied with crop oil concentrate instead of surfactant or fertilizer adjuvants. However, the crop usually recovers within 2 to 3 weeks. Do not spray if rain is expected within 4 to 6 hours.

Basagran plus Blazer or Tackle improves control of pigweed and morningglory over Basagran alone and of velvetleaf and cocklebur over Blazer or Tackle alone. Rates vary depending upon weed species and size. Fertilizer adjuvants can improve velvetleaf control. **Storm 4S and Galaxy 3.67S** are premixes of Basagran and Blazer. Storm at 1.5 pint per acre is equivalent to 1 pint of Basagran plus 1 pint of Blazer. Galaxy at 2 pints per acre is equivalent to 1.5 pints of Basagran plus 0.67 pint of Blazer. See the labels for adjuvant specifics.

Cobra 2E (lactofen) is applied at 12.5 fluid ounces per acre with crop oil concentrate (COC) at 0.5 to 1 pint per acre. One gallon per acre of 28-0-0 (UAN) may be substituted for COC under favorable growing conditions. Weeds controlled include cocklebur, pigweed, jimsonweed, common ragweed, and velvetleaf. Cobra usually causes soybean leaf burn, but soybeans usually recover within 2 to 3 weeks. Cobra can be tank-mixed with Basagran, Classic, Scepter, or 2,4-DB. Apply Cobra only once during the season and no later than 90 days before harvest. Do not apply if rain is expected within 30 minutes.

Reflex 2LC (fomesafen) is used at 0.75 to 1 pint per acre, north of Interstate 70 and at 1.25 pint south of Interstate 70. Add either crop oil concentrate at 1 gallon or nonionic surfactant at 1 to 2 quarts per 100 gallons of spray. Reflex controls pigweed, black nightshade, jimsonweed, smartweed, and common ragweed up to the 4-leaf stage. Reflex can be tank-mixed with Basagran, Classic, or Scepter to broaden the spectrum of control. Do not spray if rain is expected within 4 hours of application. *Do not apply Reflex beyond 3 weeks after soybean emergence.* There is a potential for carryover, so be sure that applications are accurate and even. Recrop intervals are 4 months for small grains, 10 months for corn, and 18 months for other crops.

Translocated broadleaf herbicides

Classic, Pinnacle, Pursuit, and Scepter are translocated herbicides which primarily control broadleaf weeds in soybeans. See Table 9 for weeds controlled. All four have the same mode of action and some soil residual activity. Weeds should be actively growing (not moisture or temperature stressed). Do not make applications when weeds are in the cotyledon (very early seedling) stage. Annual weeds are best controlled when less than 3 to 5 inches tall (within 2 to 4 weeks after soybean emergence). A one-hour rain-free period is usually adequate for these herbicides.

These herbicides inhibit growth of new meristems so symptoms of weed injury may not be exhibited for 3 to 7 days. Injury symptoms are yellowing of leaves followed by death of the growing point. Death of leaf tissue in susceptible weeds is usually observed in 7 to 21 days. Less susceptible plants may be suppressed, remaining green or yellow but stunted for 2 to 3 weeks.

Soybeans may show temporary leaf yellowing (golden tops) and/or growth retardation (stunting), especially if the soybeans are under stress. Under favorable conditions, affected soybeans may recover with only a slight reduction in height and no loss of yield.

Total spray coverage is not critical for translocated herbicides. A minimum spray volume of 10 gallons per acre may be used for ground application using flat-fan nozzles at 20 to 40 psi or hollow cone nozzles at 40 to 60 psi. Nonionic surfactants (NIS) are usually specified at 1 to 2 pints per 100 gallons of spray. Crop oil concentrate (COC) may improve weed control, but may increase crop injury. Fertilizer additives (28-0-0 or 10-34-0) improve control of some weeds, and are specified for velvetleaf control on the Classic, Pinnacle, and Pursuit labels. Tank-mixing these herbicides with postemergence herbicides for grass may reduce grass control, so sequential applications are often specified.

Classic 25DF (chlorimuron) is used at 0.5 to 0.75 ounce per acre plus 1 quart of surfactant or 1 gallon of crop oil concentrate per 100 gallons. Fertilizer adjuvants improve velvetleaf control. Classic can control cocklebur, jimsonweed, wild sunflower, and yellow nutsedge. Pigweed control varies with rate and species. Check the label for weed sizes and rates. Split applications can improve control of burcucumber, giant ragweed, and annual morningglory. Do not apply Classic within 60 days of harvest. *Do not apply Classic if soil pH is over 7.0.* Recrop intervals are 3 months for small grains and 9 months for field corn, sorghum, alfalfa, or clover. If Classic is applied after Preview, Canopy, Lorox Plus, Pursuit, or Scepter, check the label for recrop intervals. Carryover injury to corn can occur, especially if soil pH is above 7.0. Corn appears stunted with interveinal chlorosis or purpling of leaves and inhibition of roots.

Pinnacle 25DF (DPX M-6316) is used at 0.25 ounce per acre to control lambsquarters, pigweed, smartweed, and velvetleaf. The addition of 1 gallon of 28-0-0 per acre improves velvetleaf control. Tank-mixing with 0.25 ounce of Classic 25DF per acre with Pinnacle can improve control of cocklebur, jimsonweed, and wild sunflower. Add nonionic surfactant at 1 pint per 100 gallons. *Do not use crop oil concentrate.* Pinnacle has less persistence than Classic. Any crop may be planted 45 days after application of Pinnacle alone. Classic recropping intervals apply for the tank-mix.

Pursuit 2E (imazethapyr) is used at 0.25 pint per acre plus surfactant at 1 quart per 100 gallons of spray. Add 1 quart per acre of 28-0-0 or 10-34-0. Most broadleaf weeds should be less than 3 inches tall, but cocklebur and pigweed may be controlled up to 8 inches tall. Lambsquarters, common ragweed, and annual morningglory control may be poor. It may also provide some control of foxtails and shattercane but not volunteer corn. Do not apply Pursuit within 85 days of soybean harvest. Recropping intervals are 4 months after application for wheat, 9.5 months for field corn, and 18 months for other field crops *including grain sorghum.* See Table 8. Do not apply products containing chlorimuron or imazaquin the same year as Pursuit since such combinations increase the potential for injury to subsequent crops.

Scepter (imazaquin) can be used postemergence to control pigweed, cocklebur, wild sunflower and volunteer corn in soybeans. The low rate is 1/3 pint of 1.5E or 1.4 ounces of 70DG. A higher rate is labeled, but rotational guidelines change. Scepter is better on cocklebur and volunteer corn than Pursuit, but Pursuit is better on velvetleaf and shattercane. Use a nonionic surfactant at 2 pints per 100 gallons. Do not apply Scepter within 90 days of soybean harvest. Follow rotational guidelines on the Scepter label or see Table 8. Also see the recrop discussion on Scepter in the preplant or preemergence section.

Rescue (naptalam plus 2,4-DB), a premix of two translocated herbicides, is used at 2 to 3 quarts per acre for midseason control of cocklebur, giant ragweed, and wild sunflower. Apply after soybeans are 14 inches tall or after first bloom. Rescue can be tank-mixed with Blazer or Tackle to control more weeds and provide faster action on the weeds. Add crop oil concentrate or surfactant at the manufacturer's recommended rate. Effectiveness may be reduced if rain occurs within 6 hours. Crop injury often occurs as leaf twisting and drooping tops. Do not apply Rescue to soybeans under stress from drought, disease, or injury from another herbicide. Do not apply Rescue within 60 days of harvest.

Translocated grass herbicides

Poast, Assure, Fusilade, and Option can control many annual and perennial grasses in soybeans (see Table 11). Pursuit also has some postemergence grass control. Grasses should be actively growing (not stressed or injured) and not tillering or forming seedheads. Cultivation within 5 to 7 days before or after application may decrease grass control. Addition of crop oil concentrate is usually specified, especially if the weeds are somewhat droughty or label limitations on weed size are approached.

Rates vary by weed size and species, so consult the label before applying. Rate reductions may be optional on small weeds while rate increases may be needed for larger weeds. Crabgrass, field sandbur, and barnyardgrass control vary with herbicide and size. Control of johnsongrass and quackgrass often requires follow-up applications for control of regrowth. *Volunteer cereals* such as wheat and rye can be controlled by Assure, Fusilade, or Poast if the plants have not tillered or overwintered.

Specified spray volume per acre is 10 to 20 gallons for ground application or 3 to 5 gallons for aerial application. A one-hour rain-free period after application is needed. Avoid drift to sensitive crops such as corn, sorghum, or wheat. Apply before bloom stage of soybeans and at least 80 to 90 days before harvest.

These herbicides do not control broadleaved weeds. Most labels allow tank-mixing with certain broadleaf herbicides, but limitations are made as to rate, timing, and spray coverage. *Check the label before applying grass and broadleaf herbicide tank-mixes or sequences as control of grass weeds may be reduced.*

Poast 1.5E (sethoxydim) is used at 1 pint per acre to control most annual grasses including foxtails, fall panicum, volunteer corn, or shattercane. See label for weed sizes and special rates for smaller or larger weeds. Fertilizer adjuvants are specified for control of volunteer corn and shattercane. Always add 2 pints per acre of Dash or crop oil concentrate. **Poast Plus 1E** has extra additives to improve performance. The rate is 1.5 pints instead of 1 pint per acre to compensate for the change of active ingredients. Poast or Poast Plus can be tank-mixed with Basagran and/or Blazer or Tackle. See the label for more information on rates

Table 11. Soybean Postemergence Herbicides and Their Grass Control

Herbicide	BYG	CBG	FLP	GFT	YFT	WCG	SBR	SHC	VCN	VCL	JHG	QKG	WSM
Assure	8+	9	9+	9+	9	9	9	10	10	9	9	9	9
Fusilade	8+	8	8	9	8	9	9	10	10	9	9	9	9
Option/Whip	8	7	8+	8+	8	8	–	9	10	–	8	–	8
Poast Plus	9	8	9+	9+	9	9	7	8	8	7	7	7+	8
Pursuit	6	7	7	7+	6	5	4	7	4	3	3	0	2

– = weed not on label or insufficient information.
Note: Annual grasses are BYG = barnyardgrass, CBG = crabgrass, FLP = fall panicum, GFT = giant foxtail, YFT = yellow foxtail, WCG = woolly cupgrass, SBR = sandbur, SHC = shattercane, VCN = volunteer corn, and VCL = volunteer cereal (wheat, oats, rye).
Perennial grasses are JHG = johnsongrass, QKG = quackgrass, and WSM = wirestem muhly.

Rating Scale:
10 = 95 to 100%, 9 = 85 to 95%, 8 = 75 to 85%, 7 = 65 to 75%, 6 = 55 to 65%, and 5 = 45 to 55%.

and weed sizes. See "Problem perennial weeds" section for control of perennial grasses.

Assure 0.8E (quizalofop) is used at 14 fluid ounces per acre to control foxtails and fall panicum. Use 10 fluid ounces per acre to control volunteer corn or shattercane. Refer to the label for weed sizes. Add either 1 gallon of crop oil concentrate or 2 quarts of nonionic surfactant per 100 gallons of spray. Assure can be tank-mixed with Basagran or Classic. Refer to the label for rates and weed sizes. See "Problem perennial weeds" section for control of perennial grasses.

Fusilade 2000 1E (fluazifop) is applied at 1.5 pints per acre to control giant foxtail and other annual grasses. Use 0.75 pint per acre for volunteer corn or shattercane. Refer to the label for weed sizes and rates. Add either 1 gallon of crop oil concentrate or 1 quart of nonionic surfactant per 100 gallons of spray. Fusilade can be tank-mixed with Reflex, Tackle, or Blazer. See the label for rates and weed sizes. See "Problem perennial weeds" section for control of perennial grasses.

Option 1E (fenoxaprop) is used at 0.8 pint per acre to control giant foxtail, volunteer corn, or shattercane. Use 1.2 pint per acre for fall panicum or barnyardgrass control. Crop oil concentrate is required for yellow foxtail and crabgrass but is optional for shattercane. See perennial weed section for control of perennial grasses. Option can be tank-mixed with Basagran, Blazer, or Tackle. See the label for instructions.

Roundup (glyphosate) may be applied through rope-wick applicators to control volunteer corn, shattercane, and johnsongrass. Hemp dogbane and common milkweed may also be suppressed. Weeds should be at least 6 inches taller than the soybeans to avoid contact with the crop. Adjust the height so that the wiper contact is at least 2 inches above soybeans. Mix 1 gallon of Roundup with 2 gallons of water for rope-wick applicators. Spot treatment can be made on a spray-to-wet basis using a 2-percent solution of Roundup in water. Motorized spot treatment may provide less complete spray coverage of weeds, so use a 5-percent solution of Roundup. Minimize spray contact with the soybeans.

Soybean harvest aid

Gramoxone Super or Extra (paraquat) may be used for drying weeds in soybeans just before harvest. For indeterminate varieties (most of the varieties planted in Illinois), apply when 65 percent of the seed pods have reached a mature brown color or when seed moisture is 30 percent or less. For determinate varieties, apply when at least one-half of the leaves have dropped and the rest of the leaves are turning yellow.

The rate is 11 to 21 ounces of Gramoxone Super 1.5S or 12.8 ounces of Gramoxone Extra 2.5S. Use the higher rate on cocklebur. The total spray volume per acre is 2 to 5 gallons for aerial application and 20 to 40 gallons for ground application. Add 1 quart of nonionic surfactant per 100 gallons of spray. Do not pasture livestock within 15 days of treatment, and remove livestock from treated fields at least 30 days before slaughter. *Gramoxone is a restricted-use pesticide.*

Problem Perennial Weeds

Perennial weeds are on the increase throughout most of Illinois. Reduced tillage, more restrictive crop rotation practices, and a reduction in competition from annual weeds are the primary causes of the increase.

Perennial weeds are often found in dense localized infestations or lightly scattered within fields. However, even small populations can cause reductions in crop yield, grain quality, and harvesting efficiency and can develop into very serious infestations if left untreated.

Control of most perennials is difficult at best. This is mostly due to the fact that perennials reproduce both by vegetative propagation and by seed. Light tillage, such as the use of a chisel plow or field cultivator, may drag root sections about the field where new shoots emerge and the problem spreads. If tillage is to be beneficial, root sections displaced by tillage must be exposed to the freeze-thaw cycle of winter weather or left on the soil surface to desiccate. Repeated mowings, where possible, or row cultivation can deplete food reserves these plants store in the roots.

Effective control of perennial weeds will often rely on a combination of mechanical control methods and the use of translocated (systemic) herbicides. Tillage

and herbicide applications used in combination will weaken the vegetative regeneration of plant parts and suppress seedling development. Since no program is 100 percent effective, elimination of perennial weeds from a single location may take years of treatment. When using systemic herbicides, control of perennials is often more effective when low dosage, multiple treatments are applied. This results in better movement of the herbicide into the roots and a more complete kill of perennial plant parts. Contact herbicides, which do not move within the plant, will not be effective in preventing regrowth from plant roots.

Table 12 lists common herbicides recommended for control or suppression of many perennial weeds. Although not indicated in this table, it should be emphasized that isolation of an infested area is often necessary to effectively treat perennial weeds. This can be done by rotating the affected field to small grains or forage legumes, government set-aside, or to a crop where herbicides or mechanical controls can be used.

With any perennial weed infestation, if the affected area is small enough or if plants are lightly scattered through a field, spot treatment with a 2 percent solution of Roundup (3 oz in 1 gal) in a hand-held sprayer is highly effective. Although Roundup is nonselective and must be kept from contacting desirable vegetation, it can be applied to perennial weeds almost any time they are actively growing and have sufficient foliage to absorb and translocate the herbicide.

Roundup can also be used in rope wick applicators and applied to weeds which exceed the height of the crop by 6 inches or more. For wick applicators dilute 1 gallon of Roundup in 2 gallons of water. Do not till the soil for 5 days before or after any Roundup application.

Following in Table 12 are recommendations for control of many of the most common perennial weeds in Illinois. Be sure to observe all precautions regarding drift and crop injury when applying any of the herbicides mentioned. These precautions can be found on the herbicide labels.

Table 12. Problem Perennial Weeds

Weed	Crop	Herbicide	Remarks
Bindweed	Corn	2,4-D ester 0.5 pt/A or amine 1 pt/A of 3.8 a.e.*	Apply in spring when leaves are fully expanded or apply preharvest after brown silk stage in corn. The ester formulation is perferred. Use drop nozzles when corn is over 8 inches tall.
		Banvel at 0.5 to 1 pt/A	Use the 0.5 pt rate of Banvel on sandy soils and on corn taller than 8 inches, or up to 2 weeks before tassel, whichever comes first.
	Soybeans	Blazer, Cobra, Tackle (rates on label)	Vines may be suppressed by applications. Control can be improved by adding 2 fluid ounces/A of Butyrac 200.
Bigroot morningglory	Corn	2,4-D amine 1 pt/A or ester 0.5 pt/A of 3.8 a.e.	Use on actively growing plants that have sufficient vine growth to which to apply the herbicide (10 to 24 inches).
Canada thistle	Corn	Atrazine at 2 qt + 2 qt	Apply 2 lb a.i. in fall or early spring and follow 10 to 14 days later with tillage. Incorporate second application just prior to planting or apply as posttreatment with crop oil before thistles are 6 inches tall. Plant only corn or sorghum the following year.
		Banvel at 0.5 to 1 pt/A or 2,4-D amine 1 pt/A or ester 0.5 pt/A of 3.8 a.e.	Use the 0.5 pt rate of Banvel on sandy soils and on corn taller than 8 inches or up to 2 weeks before tassel, whichever comes first. Use drop nozzles when corn is over 8 inches tall.
		Laddok 3.5 pt/A	Suppression only. Apply when Canada thistle is 8 to 10 inches tall. Use with 2 pt/A COC.
		Buctril 1.5 pt/A or Buctril/atrazine 2 to 3 pt/A	Suppression only. Apply to weeds from 8 inches tall to the bud stage or up to tassle emergence on corn. Do not add spray additives.
	Corn/Soybeans	Roundup 2 to 3 qt/A	Apply after harvest and prior to tillage in fall. Do not till for 3 days after application. Weeds should be actively growing.
		Basagran 1 qt/A	Will suppress thistle growth. Retreatment 7 to 14 days later with Basagran, or cultivation may be necessary to maintain suppression.

Table 12. Problem Perennial Weeds (continued)

Weed	Crop	Herbicide	Remarks
Common milkweed and Hemp dogbane	Corn	2,4-D amine 1 to 2 pt/A or ester 1 to 2 pt/A of 3.8 a.e.	Apply mid to late season after corn silks have turned brown and plants are actively growing and have adequate foliage.
Honeyvine milkweed	Corn	2,4-D ester 0.5 pt/A or 2,4-D amine 1 pt/A of 3.8 a.e. or Banvel 0.5 to 1 pt/A or 2,4-D + Banvel at half rates	The ester formulation of 2,4-D is preferred; however, a combination of 2,4-D and Banvel may be better than 2,4-D used alone. Check Banvel label for restrictions.
	Soybeans	Blazer, Cobra, Tackle at label rates	May be suppressed by these contact herbicides. Cultivation may be necessary to improve control.
Jerusalem artichoke	Corn	Banvel 0.5 to 1 pt/A or Banvel + 2,4-D at half rates	Treat weeds when they are 8 to 16 inches tall. Use the 0.5 pt rate of Banvel on sandy soils and on corn taller than 8 inches or up to 2 weeks before tassel whichever comes first. Use drop nozzles when corn is over 8 inches tall.
		Atrazine 2 qt + 2 qt	Apply 2 lb a.i. in fall or early spring and follow in 10 to 14 days with tillage. Incorporate a second application just prior to planting. Plant only corn or sorghum the following year.
	Soybeans	Pursuit at 4 fluid oz/A Classic at 0.75 oz/A	Pursuit should be applied to plants that are 6 to 10 inches tall and Classic to plants less than 8 inches tall. Small weeds just emerging may have sufficient root/tuber reserves to begin regrowth after treatment and a cultivation may be required. Use a surfactant at 0.25 percent, or 1 qt in 100 gal.
Swamp smartweed	Corn	Banvel 0.5 to 1 pt/A	Use the higher rate on corn shorter than 8 inches. Use the lower rate on taller corn up to 36 inches or up to 2 weeks before tassel, whichever comes first, or on sandy soils. Use drop nozzles if the corn is more than 8 inches tall.
Yellow nutsedge	Corn	Sutan+, Genate Plus, Eradicane (labeled rate for soil)	Apply preplant incorporated.
		Laddok 3.5 pt/A	Suppression only. Add 2 pt/A COC.
	Corn/Soybeans	Lasso, Dual	Use higher rate for soil type and incorporate thoroughly.
	Soybeans	Scepter 2/3 pt/A	Thoroughly incorporate for best control.
		Basagran 2 pt/A	Apply 1.5 to 2 pt/A when plants are 6 to 8 inches tall. Reapply 7 to 10 days later if needed. Add 2 pt/A COC with each application.
Rhizome or seedling Johnsongrass	Soybeans	Assure 1.25 pt/A	Apply 1.25 pt/A of Assure to johnsongrass when 10 to 24 inches tall. For regrowth apply additional ⅞ pt/A to regrowth 6 to 10 inches tall.
		Poast 1.0 pt/A	Apply 1.0 pt/A of Poast to johnsongrass 15 to 25 inches tall. Apply 1 pt/A Poast to regrowth. Use Dash or COC and 28-0-0 (UAN).
		Fuslilade 1.5 pt/A	Fusilade can be used at 1.5 pt/A on 8 to 18 inch johnsongrass and applied to 6 to 12 inch regrowth at 1 pt/A. Use COC or nonionic surfactant.
		Option 1.2 pt/A	Apply to 10 to 20 inch johnsongrass. Do not add crop oil concentrate. Apply 0.8 pt/A to regrowth.

Table 12. Problem Perennial Weeds (continued)

Weed	Crop	Herbicide	Remarks
Quackgrass	Corn	Atrazine 2 qt + 2 qt	Apply 2 lb a.i. in fall or early spring and follow 10 to 14 days later with tillage. Incorporate second application just prior to planting. Plant only corn or sorghum the following year.
		Eradicane Extra 4 qt/A or Eradicane 6.7E 7.3 pt/A	A lighter rate may be used on lighter infestations. Use a tank-mix with atrazine to improve control.
	Corn/Soybeans	Roundup 1 to 2 qt/A	Apply prior to spring tillage or after harvest in the fall. Do not till for 3 days before or after application. Weeds should be actively growing and greater than 8 inches tall.
	Soybeans	Assure 1.25 to 2.25 pt/A	Apply 1.25 pt/A of Assure when quackgrass is 6 to 10 inches tall. For regrowth apply ⅞ pt/A when quackgrass is 4 to 8 inches tall.
		Fusilade 1.5 pt/A	Fusilade can be used at 1.5 pt/A on 6 to 10 inches quackgrass and applied to regrowth at 1 pt/A. Use COC or nonionic surfactant.
		Poast 1.5 pt/A	Apply 1.5 pt/A of Poast to quackgrass 6 to 8 inches tall and 1 pt/A to regrowth. Use Dash or COC and 28-0-0 (UAN).
Wirestem muhly	Soybeans	Assure 1.25 pt/A	Apply 1.25 pt/A of Assure when wirestem is 4 to 6 inches tall. For regrowth, apply ⅞ pt/A.
		Fusilade 1.5 pt/A	Fusilade can be used at 1.5 pt/A on 4 to 12 inches wirestem and applied to regrowth at 1.5 pt/A. Use COC or nonionic surfactant.
		Poast 1.25 pt/A	Apply 1.25 pt/A to wirestem up to 6 inches tall and 1.25 pt/A to regrowth. Use Dash or COC.
		Option 1.2 pt/A	Apply 1.2 pt/A of Option to 3 to 6 inches wirestem muhly. Use COC at 1 qt/A.

* a.e. = acid equivalent. If not 3.8 lb/gal, use equivalent amount.

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